

## **EOSDIS Core System Project**

# **Communications and System Management Segment (CSMS) Database Design and Database Schema Specifications for the ECS Project**

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May 1996

Hughes Information Technology Systems  
Upper Marlboro, Maryland

# **Communications and System Management Segment (CSMS) Database Design and Database Schema Specifications for the ECS Project**

**May 1996**

Prepared Under Contract NAS5-60000  
CDRL Item #050

## **SUBMITTED BY**

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# Preface

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This document describes the data design and database specification for the Communications and System Management Segment (CSMS) Release B. This submittal incorporates comments received from the government on the prior version and has undergone changes to reflect the expanded data analysis, design, and specifications. This submittal meets the CDR-B milestone specified in the Contract Data Requirements List (CDRL) of NASA Contract NAS5-60000.

This document is a formal contract deliverable with an approval code 1. It requires Government review and approval prior to acceptance and use. This document is under ECS contractor configuration control. Once approved, Contractor approved changes will be handled in accordance with Class I and Class II change control requirements described in the EOS Configuration Management Plan, and changes to this document shall be made by Document Change Notice (DCN) or by complete revision.

Data models presented in this document have been exported directly from tools and in some cases contain too much detail to be easily readable within hard copy page constraints. The reader is encouraged to view these drawings on-line using the Portable Document Format (PDF) electronic copy available via the ECS Data Handling System (ECS) at URL <http://edhs1.gsfc.nasa.gov>.

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# Abstract

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This document is intended to communicate database design decisions and processes to NASA and guide the implementation of the Communications and System Management Segment (CSMS) databases and application design and development. It describes the persistent data items in the System Management databases including the business rules, data specifications, entity relationship diagram, entity relationship rules, and database schema. This document also illustrates interactions between the data stores and subsystems and relationships among files in the databases. This design release has been updated to incorporate more details on the CSMS database design. The information presented in this document is intended to be used by application developers, database designers and developers, and system maintenance engineers.

As additional details are specified, the document will be updated and subsequent versions will be submitted to the government. This submittal contains comprehensive Release B information scheduled for the CDR-B milestone.

**Keywords:** manager, database, query, language, data, control, definition, manipulation, relational management, system, transaction, order, requests, subscription, user profile, order tracking, statistics, schema, data model, data specifications, data dictionary

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# Change Information Page

List of Effective Pages			
Page Number		Issue	
Title		Submitted as Final	
iii through xiv		Submitted as Final	
1-1 and 1-4		Submitted as Final	
2-1 and 2-2		Submitted as Final	
3-1 through 3-14		Submitted as Final	
4-1 through 4-32		Submitted as Final	
5-1 through 5-56		Submitted as Final	
6-1 through 6-24		Submitted as Final	
7-1 and 7-12		Submitted as Final	
A-1 through A-4		Submitted as Final	
B-1 through B-2		Submitted as Final	
C-1 through C-2		Submitted as Final	
D-1 through D-46		Submitted as Final	
AB-1 through AB-6		Submitted as Final	
Document History			
Document Number	Status/Issue	Publication Date	CCR Number
311-CD-003-001	Review Copy	January 1995	
311-CD-003-002	Review	March 1995	95-0155
311-CD-003-003	Original	August 1995	95-0483
311-CD-003-004	Preliminary	November 1995	95-0908
311-CD-003-005	Submitted as Final	May 1996	96-0464



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## **Abbreviations and Acronyms**

# 1. Introduction

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## 1.1 Identification

This Communications and System Management Segment (CSMS) Database Design and Database Schema Specifications for the ECS Project, Contract Data Requirement List (CDRL) Item # 050, with requirements specified in Data Item Description (DID) 311/DV3, is a required deliverable under the Earth Observing System Data and Information System (EOSDIS) Core System (ECS), contract NAS5-60000.

## 1.2 Purpose

The purpose of the CSMS Database Design Specification and Database Schema document is to support the CSMS segment of the ECS throughout its life cycle. It captures persistent system data requirements in a logically structured format that is useful to designers and developers. This document is also a useful tool to support configuration management of the stored system data of the ECS during design, development, and subsequent maintenance activities.

This document reflects the Technical Baseline, 14 February 1996, maintained by the ECS Configuration Control Board in accordance with ECS Technical Direction No. 11 dated December 6, 1994.

## 1.3 Scope

This CSMS Database Design Specification and Database Schema for the ECS Project document describes the data design and database specification for the CSMS Release B. The Release B content is based on an earlier version (311- CD-003-004). This submittal incorporates comments received from the government on the prior version and has undergone changes to reflect the expanded analysis and database design. 311-CD-003-005 is a living document, therefore, changes that are necessary to support the as-built version will be incorporated at a later date.

“The CSMS accomplishes the interconnection of users and service providers, transfer of information between ECS (and many EOSDIS) components, and system management of all ECS components. It supports and interacts with the Science Data Processing Segment (SDPS) and the Flight Operations Segment (FOS).

At its highest design level, CSMS consists of three parts:

- **Communications Subsystem (CSS)**

CSS is a collection of services providing flexible interoperability and information transfer between clients and servers. CSS services correspond loosely to layers 5-7 of the Open Systems Interconnection Reference Model (OSI-RM).

- **Internetworking Subsystem (ISS)**

ISS is a layered stack of communications services corresponding to layers 1-4 of the OSI-RM. CSS services reside over, and employ, ISS services.

- **System Management Subsystem (MSS)**

MSS is a collection of applications which manage all ECS resources, including all SDPS, FOS, ISS, and CSS components. MSS directly uses CSS services.”<sup>1</sup>

This document defines the design of data and information that are the responsibilities of one or more CSMS subsystems identified above. This document includes and describes the system conceptual data model and specifications and the database schema for the management data. The information will be periodically baselined at various stages of development to include the physical characteristics of the data.

## **1.4 Assumptions**

The premise for development of the information contained in this document is that the models and specifications presented will change over the development life cycle. This is true for the following reasons:

- The entire suite of Commercial Off The Shelf (COTS) software for MSS has not been finalized for Release B.
- As new COTS products become available for implementation, certain data currently documented to be contained in the MSS database will shift from ECS developed functional support to COTS system support. This will mean replacement of existing ECS developed data classes, attributes, and specifications with those defined in the COTS system.
- As new COTS products are implemented some of the existing data specifications in this document will be used to configure the software during implementation.
- Since this document is delivered after the Release B CDR, the design may be altered through corrections made to the subsystems post CDR.

## **1.5 Status and Schedule**

This submittal of DID 311/DV3 meets the CDR-B milestone specified in the Contract Data Requirements List (CDRL) of NASA Contract NAS5-60000.

This document is organized as follows to present the Communications and System Management Segment (CSMS) database design specifications:

Section 1 provides information regarding the identification, scope, status, and organization of this document.

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<sup>1</sup> Reference: The ECS System Design Specification, June 1994

Section 2 provides a listing of the related documents, which were used as source information for this document.

Section 3 provides an overview of the CSMS high-level design concept and generic system data flow diagrams (DFDs).

Section 4 provides a description of the methodology used in building the conceptual model and synchronizes it with the design and development efforts in progress. Information is included on the assumptions made in generating the conceptual model and the operational business rules used to assist data engineering in the design process.

Section 5 contains a description of the CSMS conceptual data model which is based upon the FIPS Publication #184 Entity Relationship standard, the CSMS Entity Relationship Rules, and the CSMS Data Specifications which were formerly identified as the Data Dictionary in the previous version of this document. Domain values are included as added value for pertinent attributes.

Section 6 contains the internal model which is the database tables organized by functional area.

Section 7 provides an overview of the COTS interfaces, event descriptions, log file contents and report descriptions.

Appendix A contains a preliminary data mapping for attributes in the conceptual model with the OMT model indicating both the object class and attribute name.

Appendix B identifies the MSS interface object to support subsystem design.

Appendix C provides a preliminary view of the future direction for the document content and approach to concluding the Release B analysis. It also describes the MSS prototype development effort.

Appendix D contains the detailed specification for the ECS Application MIB.

The section Abbreviations and Acronyms contains an alphabetized list of the definitions for abbreviations and acronyms used in this volume.



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## 2. Related Documentation

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### 2.1 Parent Documents

The parent documents are the documents from which this Database Specification's scope and content are derived.

304-CD-005-002	Release B SDPS/CSMS Requirements Specification for the ECS Project
305-CD-020-002	Release B SDPS/CSMS Design Overview Specification for the ECS Project
423-41-01	Goddard Space Flight Center, EOSDIS Core System (ECS) Statement of Work
423-41-02	Goddard Space Flight Center, Functional and Performance Requirements Specification for the EOSDIS Core System (ECS)
423-41-03	Goddard Space Flight Center, Contract Data Requirements Document for the EOSDIS Core System (ECS)

### 2.2 Applicable Documents

The following documents are referenced within this Database Specification, or are directly applicable, or contain policies or other directive matters that are binding upon the content of this document.

194-207-SE1-001	System Design Specification for the ECS Project
205-CD-002-002	Science User's Guide and Operations Procedure Handbook for the ECS Project, Part 4: Software Developer's Guide to Preparation, Delivery, Integration and Test with ECS
305-CD-023-002	Release B SDPS Data Management Subsystem Design Specification for the ECS Project
305-CD-025-002	Release B SDPS Subsystem Design Specification for the ECS Project
305-CD-028-002	Release B CSMS Communications Subsystem Design Specification for the ECS Project
305-CD-029-002	Release B CSMS System Management Subsystem Design Specification for the ECS Project
305-CD-030-002	Release B GSFC DAAC Design Specification for the ECS Project
305-CD-031-002	Release B LaRC DAAC Design Specification for the ECS Project

305-CD-032-001	Release B MSFC DAAC Design Specification for the ECS Project
305-CD-033-002	Release B EDC DAAC Design Specification for the ECS Project
305-CD-034-002	Release B ASF DAAC Design Specification for the ECS Project
305-CD-035-002	Release B NSIDC DAAC Design Specification for the ECS Project
305-CD-036-002	Release B JPL DAAC Design Specification for the ECS Project
305-CD-037-002	Release B ORNL DAAC Design Specification for the ECS Project
305-CD-038-002	Release B System Monitoring and Coordination Center (SMC) Design Specification for the ECS Project
313-CD-006-002	Release B SDPS/CSMS Internal Interface Control Document for the ECS Project
705-CD-005-001	ECS Release B SDPS/CSMS Incremental Design Review Presentation Package

## 3. Communications and System Management Segment (CSMS) Overview

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### 3.1 Introduction

The CSMS provides for the interconnection of users and service providers, transfer of information between the Earth Observing System Data Information System (EOSDIS) Core System (ECS) and many EOSDIS components, and management of all ECS components. It supports and interacts with the Science Data Processing Segment (SDPS) and the Flight Operations Segment (FOS). The CSMS overview addresses the following:

- **CSMS Context**

Section 3.2 establishes the context of CSMS within the ECS/EOSDIS environment

- **System Management Data Flow Concept**

Section 3.3 provides an introduction to the sources of the data in ECS

- **Generic System Data Flow Diagrams**

Section 3.4 provides a generic high level view of the data flow within CSMS by functional area.

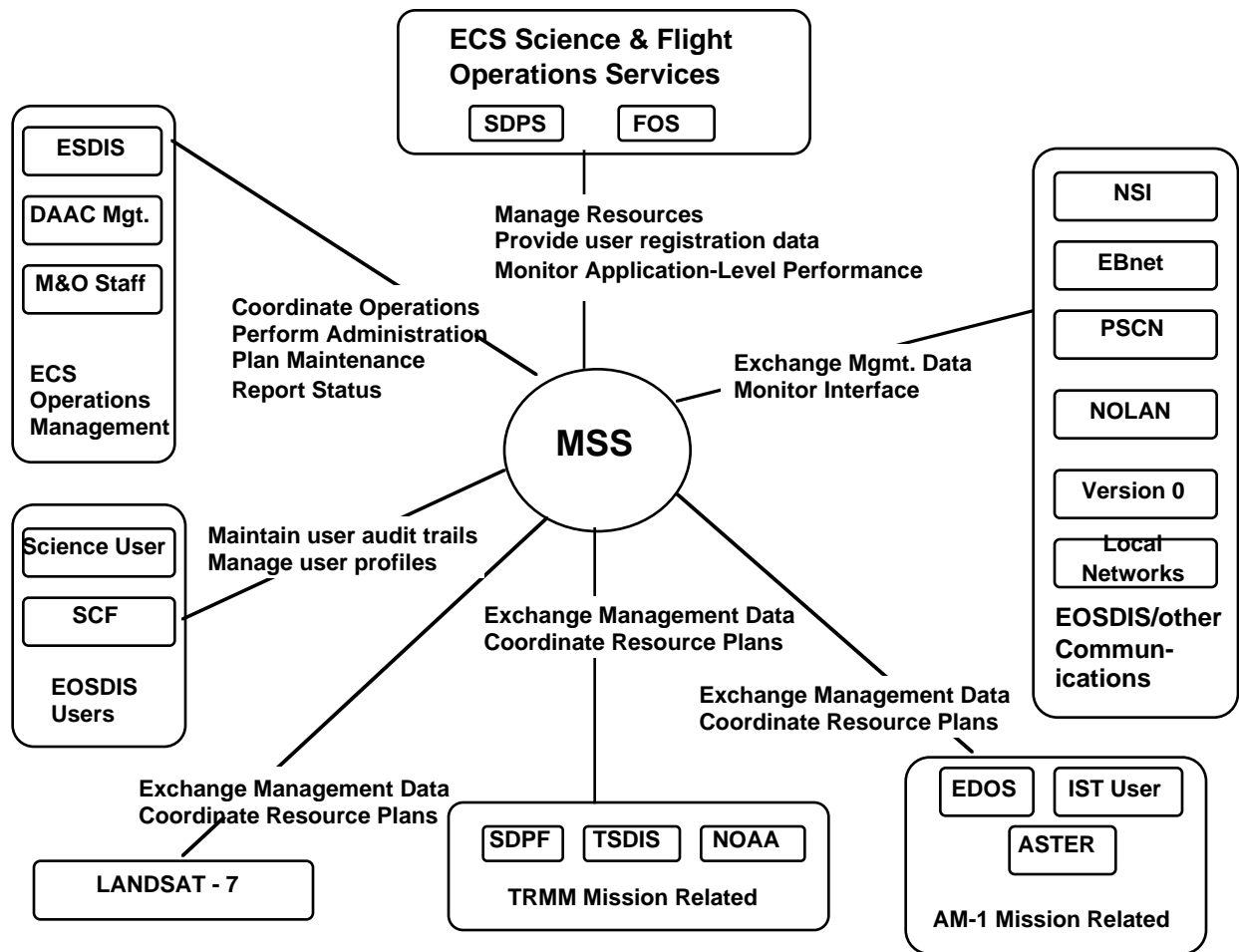
### 3.2 CSMS Context

CSMS communications services are provided to support applications and infrastructure that facilitate peer-to-peer, client-server communication including required value-added services. Management of performance, configuration, security, accountability, accounting, fault issues, and associated status exchange among ECS components is provided through CSMS services.

Through its distributed, tiered, communications and management service infrastructure, CSMS supports the requirements of Release A as well as extending beyond these capabilities for Release B to support the Landsat-7 and AM-1 missions in the near term and ADEOS II and other missions in later years<sup>2</sup>. Figure 3.2-1 illustrates the CSMS Release B management interface context that supports and controls the ECS through the database, event logs, network and system monitoring, and reporting functions of the systems management subsystems (MSS).

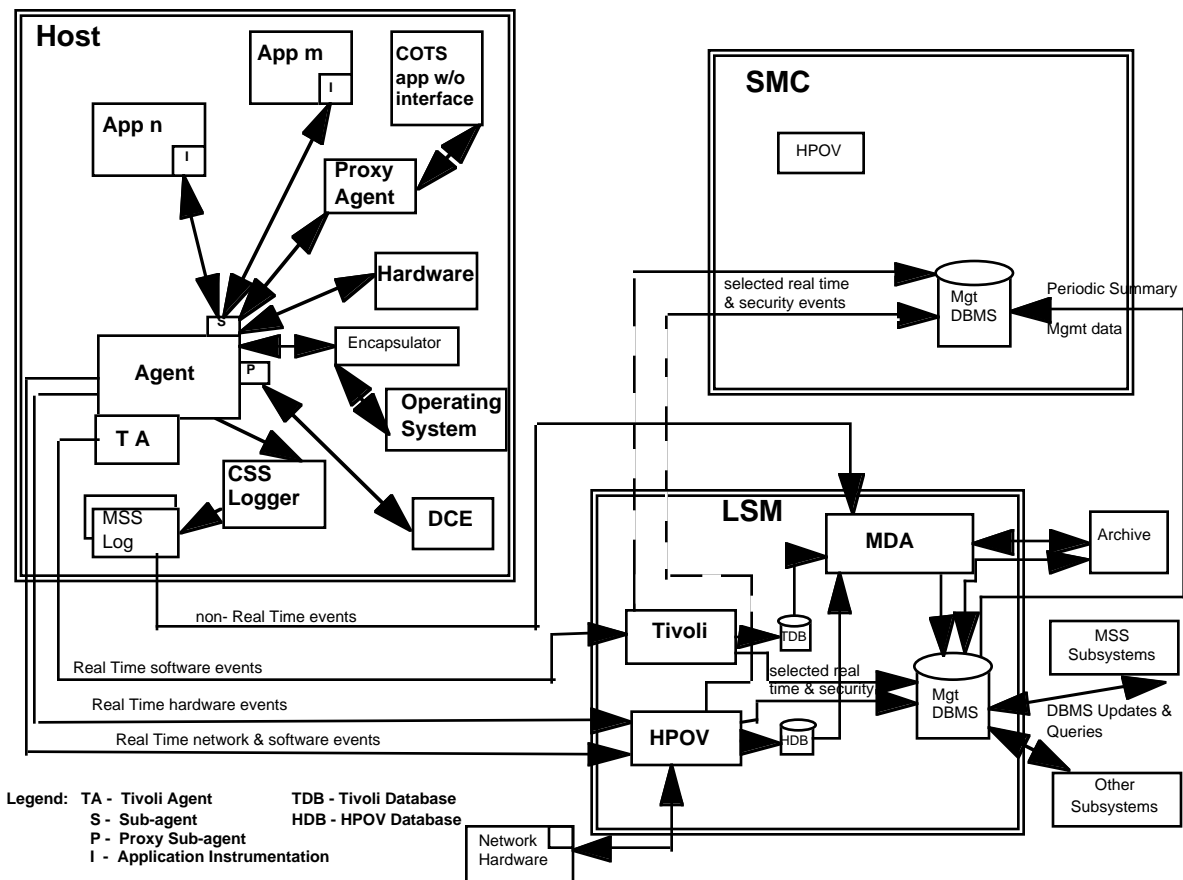
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<sup>2</sup> Reference the Technical Baseline for Release B, March 1996.



**Figure 3.2-1. ECS Element Interfaces and Data Flow**

CSMS provides ECS operations, management, and maintenance personnel with local and in some cases remote access to its enterprise management services. These interfaces support reporting of a wide-range of status information, coordination and performance of administration and maintenance services. The Event Data Flow Diagram, Figure 3.2-2 illustrates how event information flows from a typical host application server to the LSM and then to SMC. We will provide a brief description of the data flows here. For more information see DID 305 referenced in Section 2.



**Figure 3.2-2. Event Data Flow Diagram**

On each Host there will be multiple applications running in addition to COTS packages, DCE software, and Operating System software. Each of the custom built applications will have integrated Application Instrumentation as part of its code, allowing communication with the MSS Sub-agent. There will be Proxy Agents running to interface between the COTS packages which do not have an imbedded interface and the Sub-agent. The Host hardware status and the Host Operating System status will be handled via an Encapsulator with the Agent. DCE will interface with a Proxy Sub-agent.

Both the Application Instrumentation and the Proxy Agent interface directly with the Agent via the subagent. The Tivoli Agent (Tivoli Management Environment Client) is a standalone tool gathering system data for use by Tivoli. Both of these agents log all events to the MSS Log using the CSS Logger and evaluate the events as they are received, forwarding the events meeting site customizable criteria to Tivoli and selected events to HPOV on the LSM.

Network Hardware is polled by HPOV and the real time events are emitted to HPOV.

Event information forwarded to Tivoli and HPOV is processed by the COTS software and stored in the packages' custom databases.

Periodically the information stored in the MSS Log on the Host is processed by the MDA along with information extracted from the Tivoli database and the HPOV database. The information resulting from this processing is stored in the Management Database (MgtDBMS).

The information stored in each of the LSM MgtDBMS' is then periodically processed (subsetting, summarized, etc.) and sent to the MgtDBMS at the SMC for monitoring, trend analysis, and project reporting purposes.

### **3.3 System Management Data Flow Concept**

The LSM at each site collects and stores system management objects' specific data to support local operations such as performance and fault analysis, security, access control and auditing, and coordination with other sites and the SMC. While each ECS site (DAACs and the EOC) is locally managed by site-level MSS services, the EMC provides a system-wide monitoring capability, thus preserving DAAC autonomy. The services provided by EMC primarily ensure that the ground systems activities needed for the successful completion of the science mission are properly shared among the sites. The EMC also provides a source for administrative, system management, security, and accounting data information on a system-wide basis.

Data stores are used to capture management data including notifications pertaining to the managed objects as shown in Figure 3.3-1. The collected data can be stored in any one or a combination of any three types of available data stores:

- COTS databases and data files: structure, content and management of the data is provided by the COTS products (e.g., Management Framework, Configuration Management, and Security Management COTS products);
- History log files: Unix files containing event and system management information collected by custom applications; and
- Management RDBMS (MgtDBMS) files: database files containing selected information from log files, COTS data files, and data written directly into the management RDBMS (MgtDBMS) by custom or COTS applications.





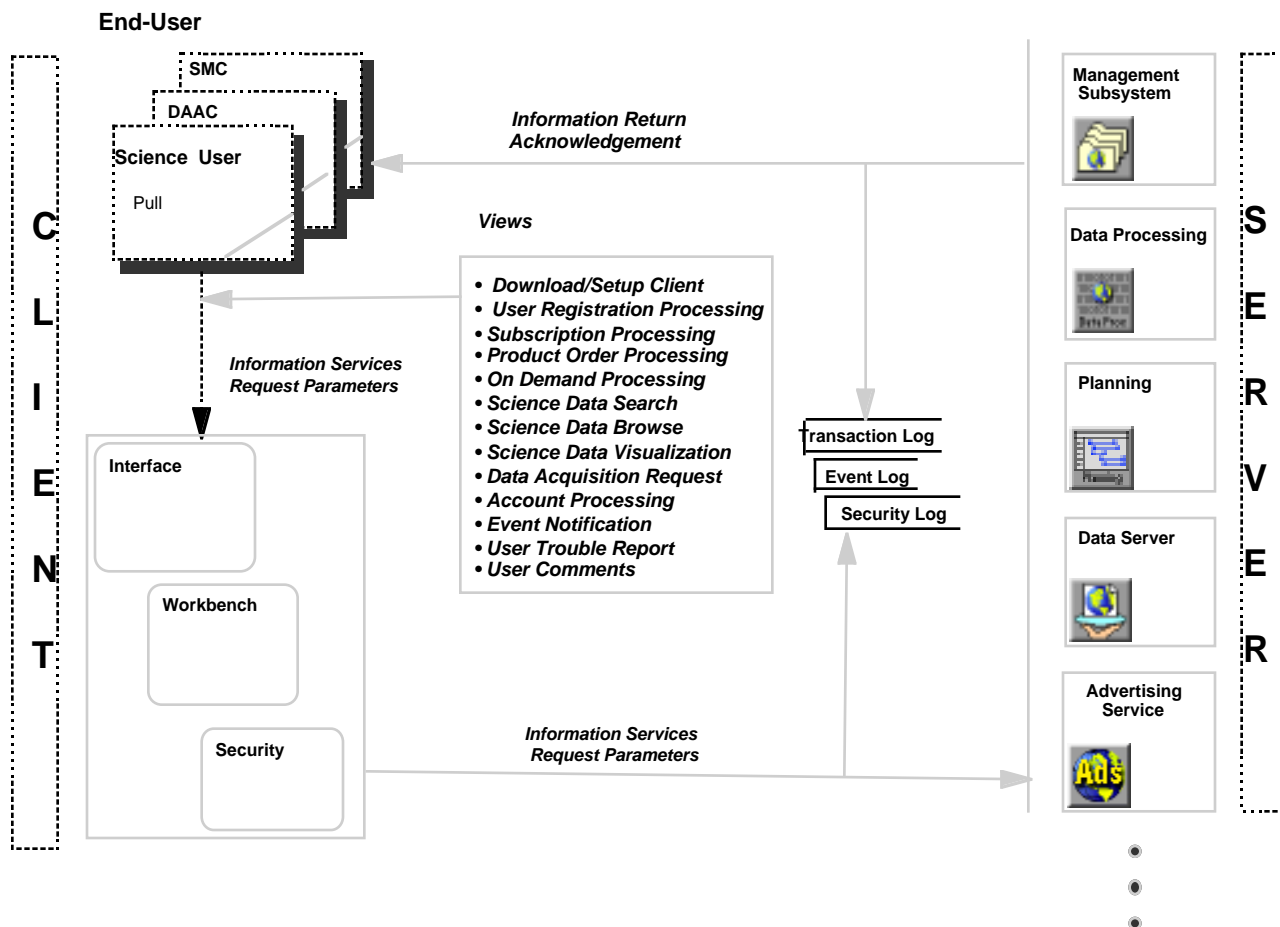
- **System Processing Events** - collection of system processing events data is intended to provide an electronic record of key data, inputs, outputs, and faults. This includes object configuration values and status, faults and notifications of all internal or externally generated faults, contents, and destination of all operator and user alarms, transfer failure errors, SW aborts/abnormal terminations, and user activities data.
- **Resource Utilization Data** - for performance and accountability purposes, it is necessary to monitor all computational, storage, archival, ingest, network and distribution resources and be able to construct highly focused queries (i.e., resource utilization of the course of a day or less) and trending (i.e., resource utilization over multiple days, weeks, months or years). The resource utilization data pertains to CPU, memory, local disk I/O and storage, network, archives, and WAN utilization statistics.
- **Security Event Data** - in order to maintain system security, it is necessary to monitor and record possible security infractions such as invalid login attempts, requests for unauthorized data, attempts to alter data without authorization, and hackers.
- **User Statistics Data** - user satisfaction is a key metric for ECS. The user statistics will be collected on volume by distribution type, timeliness (elapsed time from order receipt to data ready to data delivered), quality (did the user receive what was ordered), and resources utilized in servicing users, amount of data requested, estimated fulfillment time, etc.

The local logs from host computers are transferred to the management server periodically, processed to extract required data, and the selected information is imported into the MgtDBMS. The history logs are periodically archived through the ECS data archival service and upon successful archival are deleted from the management server. Additional information on these logs can be found in Section 7.2 of this document.

The MgtDBMS (Sybase) database files store the processed and filtered data from the history log files. The Sybase RDBMS installed at the management server in LSM at each site to store and maintain locally generated data. Section 6 of this document provides additional information on the contents of the MgtDBMS.

### **3.4 Generic Data Flow Diagrams (DFDs)**

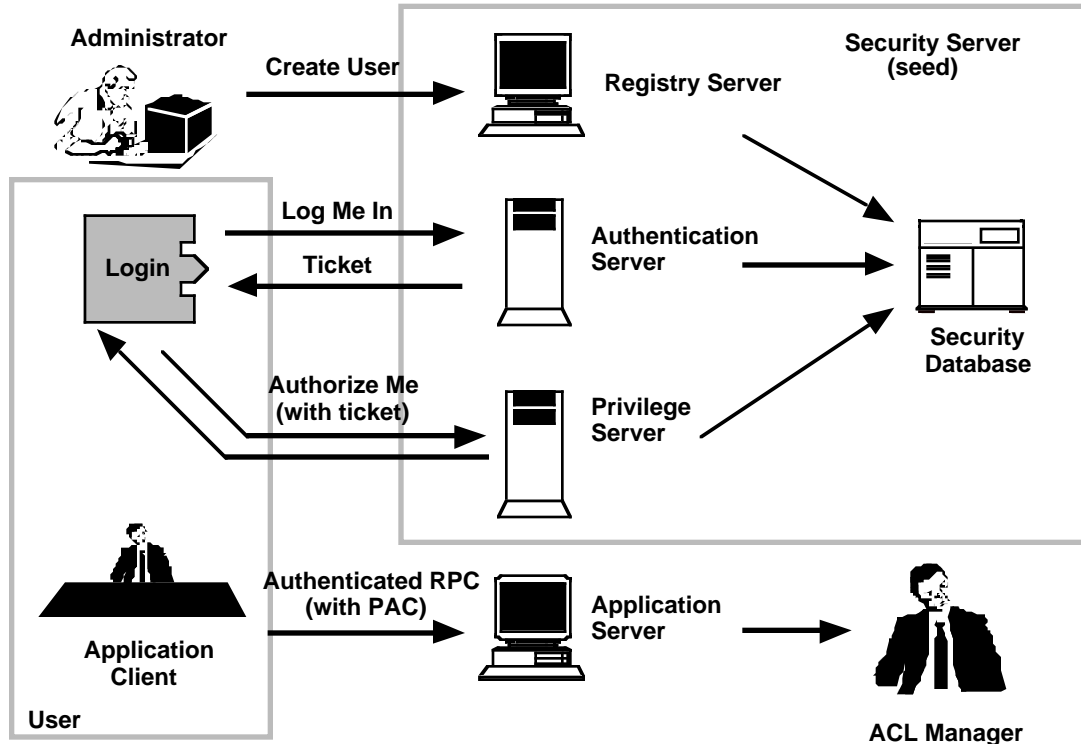
The Data Flow Diagram Figure 3.4-1 shows a general concept of the data flow related to MSS. This flow is not meant to relate to system specific implementation, the details of which are found in DID 305, but to provide a context for the primary areas where data is monitored and collected to support the subsystem framework for requests, events, and performance monitoring. The subsystems are grouped into four major areas: data storage and management, data search and retrieval, data processing, and data ingest. Management support for all typical areas is the focus of this context. Support areas are based upon the services provided within the subsystem functional categories. These categories are further decomposed to categorize the major CSMS support responsibilities of user services including user registration for maintaining system security and collecting processing status for statistical reporting; accounting and billing for direct product order and subscription services; configuration management to maintain the integrity of the infrastructure, and general training requirements.



**Figure 3.4-1. A Generic High Level Data Flow Diagram**

### 3.4.1 User Registration

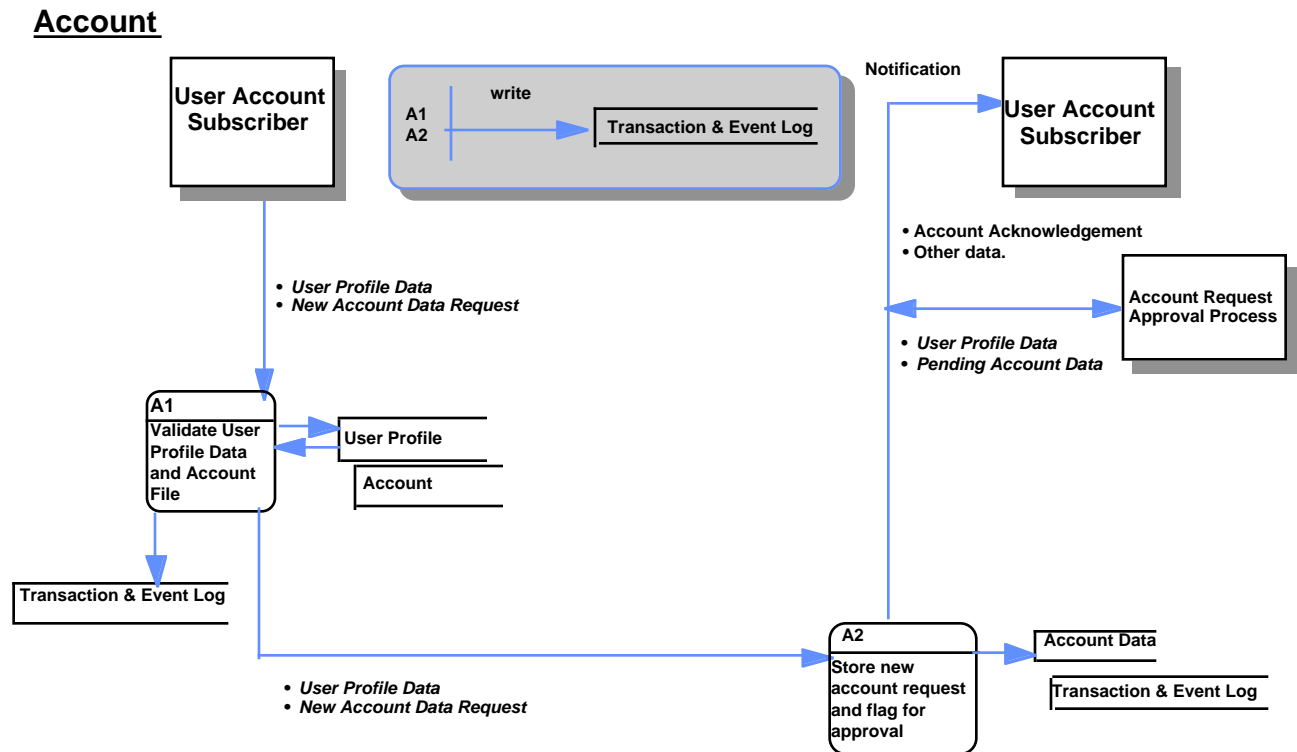
User Registration is a capability provided through the Accountability Management Service. Two generic classes of users are defined, i.e., registered and guest. Registered users are allowed access to services and products beyond those available to guest users. The registration service provides the capabilities for the creation, modification and maintenance of accounts. Accountability management services provide subsystem access to end-user information as required for operational use. The following data flow diagram describes, at a high level, the registration and (USERID), password, and user access privilege flow.



**Figure 3.4-2. Generic Data Flow Diagram -- User Registration**

### 3.4.2 Accounts

Accounts are the basis upon which services are provided to users. This is the means by which costs of these services are offset, to some degree, enabling the distribution of ECS products. Information that is required by subsystem processes for system resources are provided through the Accountability Management Service. Accounts are necessary to provide for billing, distribution of products that require cost reimbursement, accounts receivable, and tracking.



**Figure 3.4-3. Generic Data Flow Diagram -- Accounts**

### 3.4.3 Subscription Tracking

Subscriptions are a convenient means for end-users, who have interest in specific scientific disciplines and their related products, to automatically obtain information in their areas of special interest when these products becomes available. Criteria for the selection of products, which may be subscribed to, may be predefined by the interested user. The products may be existing archived products, known future products that are scheduled to be processed<sup>3</sup>, or some currently known product that may become available in the future.

A definition referenced in 205-CD-002-001 states that a subscription is a request for an action to be taken whenever a particular event occurs. Usually, a request to be notified whenever certain specified data is produced or received under certain specified conditions. To put Subscription Tracking in context see Figure 3.4-4 Overview of Subscription Processing. Figure 3.4-5 shows the proposed data flow diagram for Subscription Tracking.

<sup>3</sup> As referenced in the Science Data Plan.

```

graph TD
    A1["A1 (Batch)  
Subscription Service"]
    A2["A2  
Obtain User Profile & Account Data"]
    A3["A3  
Invoke Order/Acknowledgement"]
    A4["A4  
Format & Send Order Data/Acknowledgement"]
    User["User/Subscriber"]
    Order["Order Services"]
    T1["Transaction & Event Log"]
    T2["Transaction & Event Log"]

    A1 <--> PRP["Prod. Result Profile"]
    A1 <--> Sub["Subscriptions"]
    A1 --> A2
    A2 <--> UP["User Profile"]
    A2 <--> Acc["Account"]
    A2 -- write --> T1
    A2 --> A3
    A3 --> T2
    A3 --> A4
    A4 -- Notification --> User
    A4 --> Order
    User --> A1
    Order --> A1
  
```

**Subscription Service (A1)**

- Prod. Result Profile
- Subscriptions

**Obtain User Profile & Account Data (A2)**

- User Profile
- Account

**Transaction & Event Log**

**Invoke Order/Acknowledgement (A3)**

**Transaction & Event Log**

**Format & Send Order Data/Acknowledgement (A4)**

**User/Subscriber**

**Order Services**

**Notification**

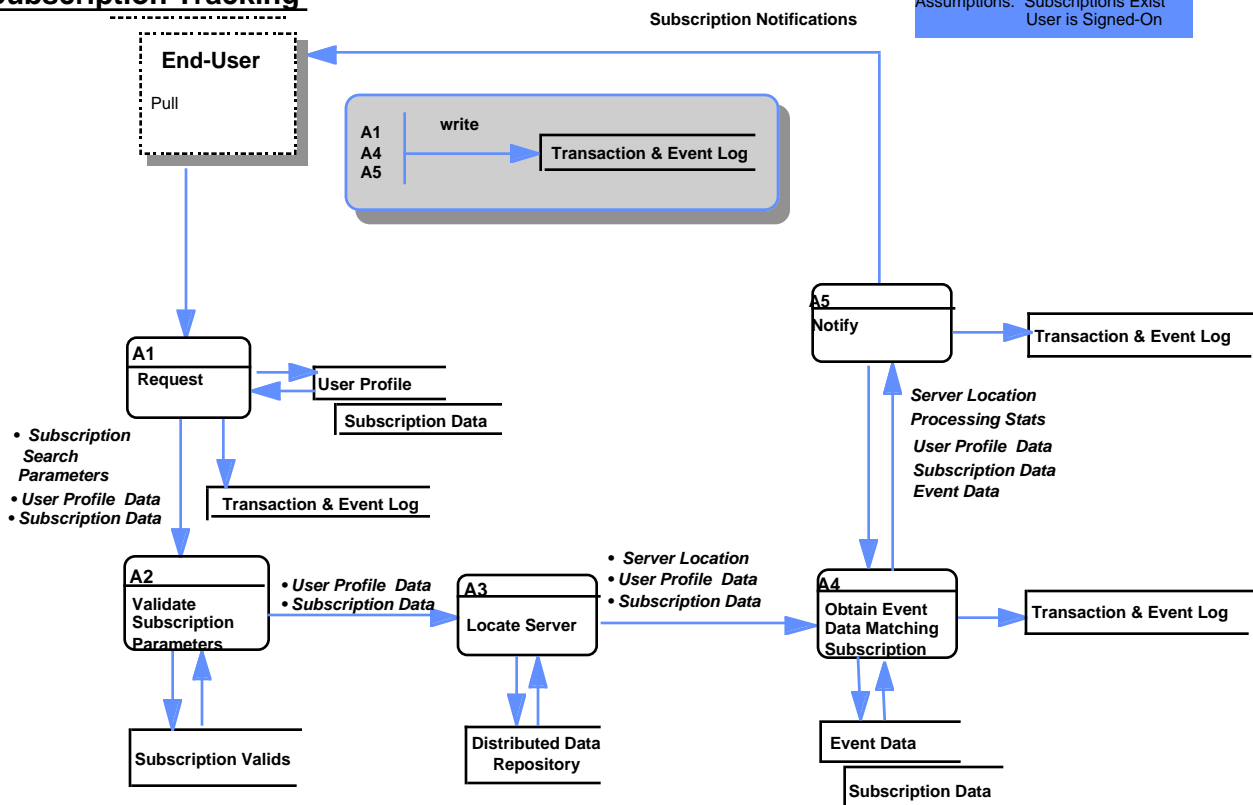
- Product UR

**Data sent to Order Services:**

- New Production Profile
- Tailored Subscription
- User Profile Data
- Account Data

**Figure 3.4-4. Generic Data Flow Diagram – Subscription**

## Subscription Tracking

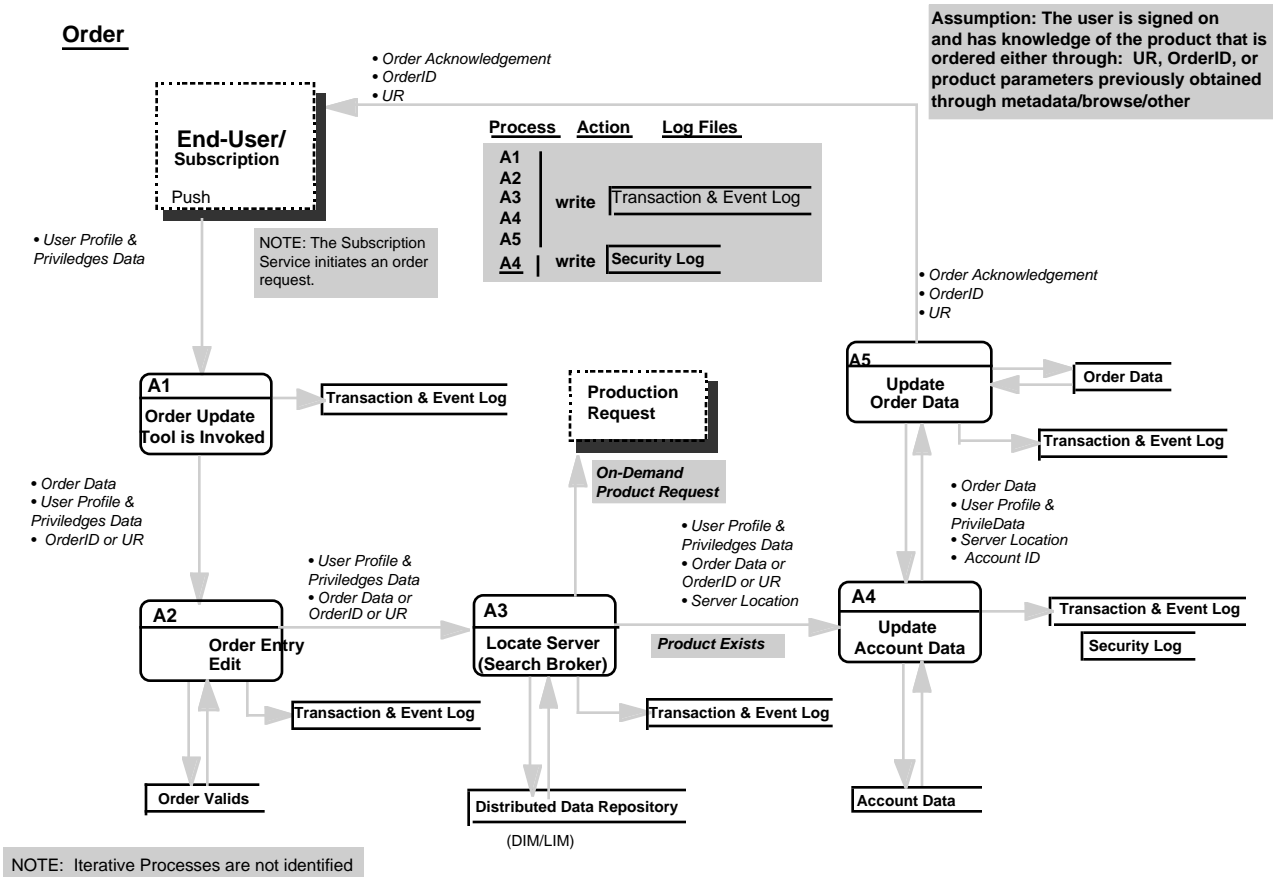


**Figure 3.4-5. Generic Data Flow Diagram – Subscription Tracking**

### 3.4.4 Order Tracking

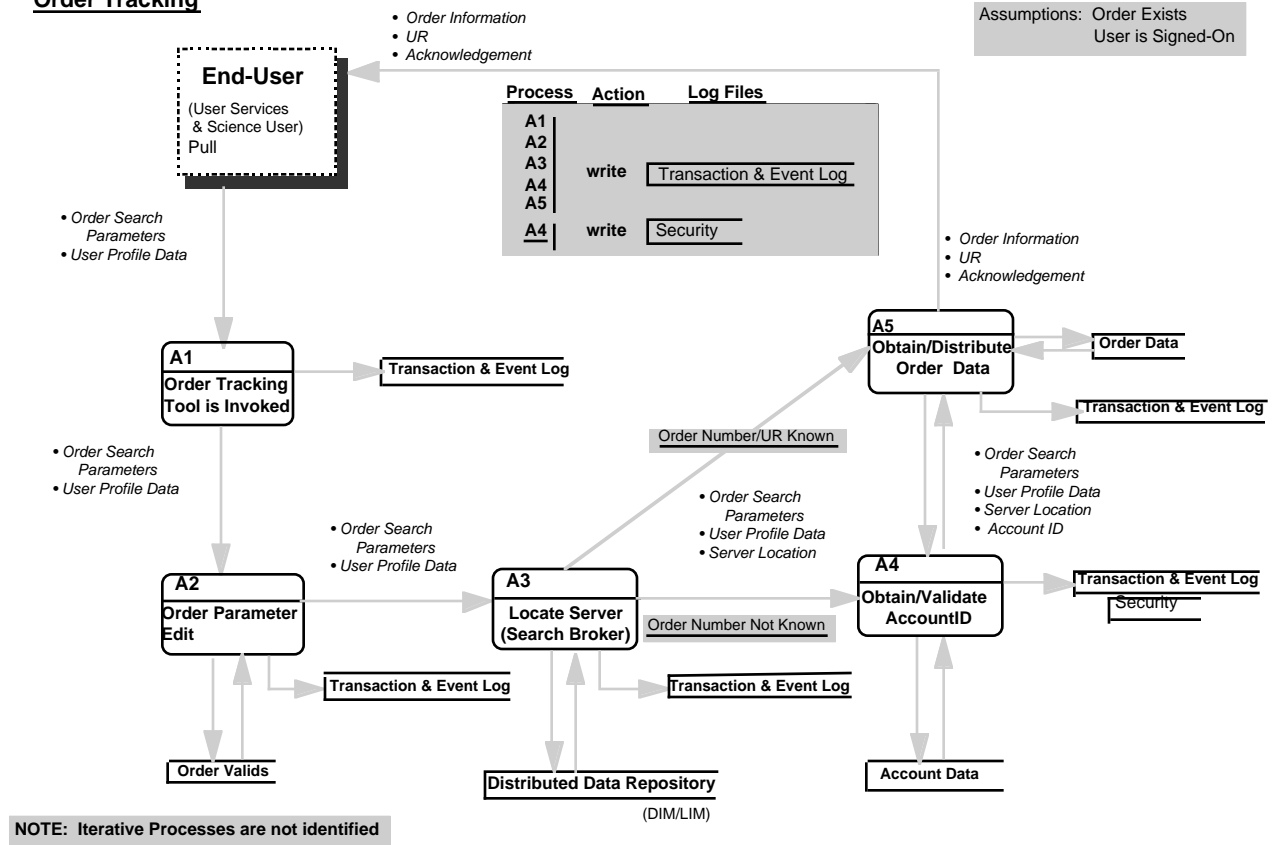
An order is created by an interested user via various access methods. A single order may include one or many different products. Each product ordered is managed separately, i.e., tracked, scheduled, shipped. Further, if several products are available at the time of shipping, the products may be packaged together in a single shipment. For Release A, products from a single order that are required to be processed by other than the “home” DAAC, are extracted and submitted as another order to the processing DAAC. The order is managed by the processing DAAC and tracked through direct access to the processing DAAC. For Release B, the order is tracked and managed by the “home” DAAC regardless of where the processing takes place. A data flow diagram of the Order process is shown in Figure 3.4-6.

Order tracking is an inquiry against the status of the order or a particular suborder. Order status is recorded in the MSS database and linked appropriately to the order or suborder. Each user request for order status is logged to provide information for reporting on system usage and performance and for historical reference. Figure 3.4-7 show the Order Tracking Data Flow Diagram.



**Figure 3.4-6. Generic Data Flow Diagram -- Order**

## Order Tracking

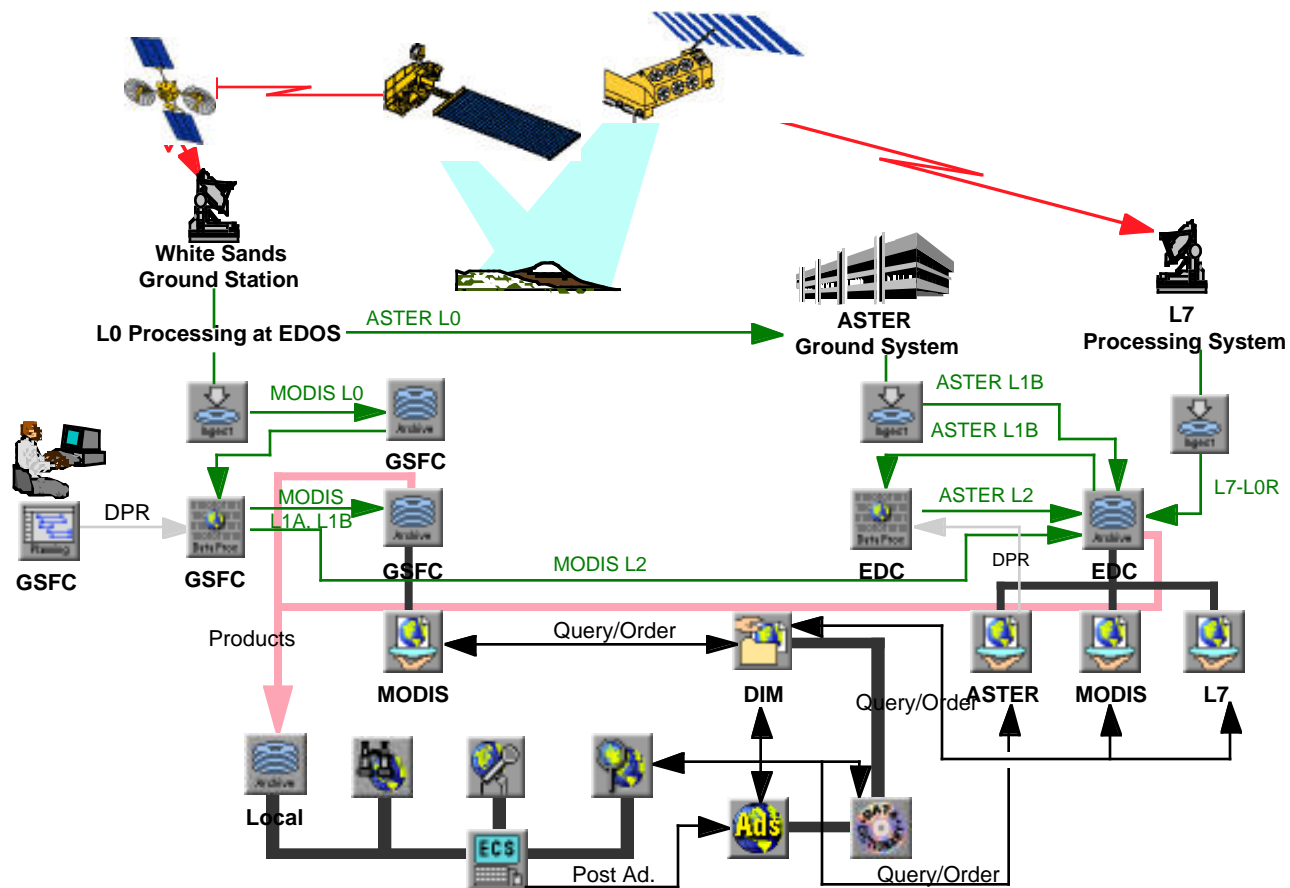


**Figure 3.4-7. Generic Data Flow Diagram -- Order Tracking**

### 3.4.5 Ingest

Ingest is responsible for the receipt of data arriving at a site and the initial physical placement of data into the site's storage hierarchy. Data is ingested from external data providers (e.g., SDPF, TSDIS, NOAA/NESDIS) and VO data migration. The data may be delivered through a wide variety of interfaces (e.g., network file transfer, hard media) with a wide variety of management approaches to these interfaces. The interface heterogeneity and the need to support extensibility and new data/interfaces as algorithms and provider functionality change, leads to a design in which the ingest functionality is isolated from other subsystems within the segment design. This subsystem implements a table-driven design to identify and invoke appropriate processing for a given interface.





**Figure 3.4-8. Generic Data Flow Diagram -- Ingest**

## 4. Data Analysis and Database Design Methodology

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### 4.1 Introduction

The iterative nature of the Database Design process requires that a means of communication between the application design and development teams, the data engineering organization and the user community be in place and functional. The first two groups need to be in constant contact to resolve issues related to the database design, implementation, and tuning. In order to design a database which satisfies the requirements of the ECS system and each of its releases, there will be many iterations of the actual implementation of the MgtDBMS.

In order to provide a better means of ongoing communication we have established a database bulletin board where information regarding the current database design, outstanding issues, assumptions etc. can be posted so all the ECS project staff will have access to the work being performed in data engineering.

We have implemented a series of facilitated working sessions with team members from both Release A and Release B supporting MSS and the other subsystems interfacing with the MgtDBMS. During these facilitated sessions, we are reviewing all of the assumptions and business rules used in the Release A database design and refining the Conceptual Model accordingly.

We have also established a series of tables where we will be enumerating detail domain values etc. for the attributes in the MgtDBMS, not explicitly enumerated in the Data Dictionary. As the actual domain values of the attributes are identified in the facilitated sessions and recorded, we will use these values to test and validate the business rules using a database modeling tool.

When the results of the facilitated sessions reflect the best understanding of the members of the working team, they are posted on the Bulletin Board for other team member review. These results of the facilitated sessions are then incorporated into the Conceptual Model as updates to the Entity Relationship Diagram, the Business Rules, and the Data Dictionary and the next iteration begins.

We have also facilitated and participated in a series of meetings to refine the ECS project management reporting requirements in order to validate that data needed in the MgtDBMS for management reporting will be available, and to identify where COTS packages will be able to meet reporting requirements from the packages data stores..

### 4.2 Data Analysis

Data analysis commences with the definition of the Operational Business Rules which are those rules, guidelines, statements of policy, or statements of procedure which frame how the real business world operates. These business rules are sometimes formally stated in official policy statements or procedure manuals, but are just a frequently part of the culture about how things

are done within the business. By clear definition of the business rules for managing the business or the project, we can identify the information necessary for the operation of the business or project and how it is related. This information can then be formulated into the components of the ERD.

#### 4.2.1 Operational Business Rules

Business rules are a statement of the policy and procedures by which ECS will conduct its business internally and externally with the end-user. They form the basis of the system design (including data) and are developed from review of ECS requirements, functional specifications, and general business practice knowledge of the authors. The business rules contained in this section were identified by the data engineering team and reviewed internally by the sub-system developers and by the project. These rules are developed to better understand the data relationships and data usage and to obtain a design. The rules captured here reflect where we are today in thinking about the business rules. We include them here for your review. This is a living document and will be updated as required until a final set of rules are developed.

##### 4.2.1.1 User Registration

User Registration is a capability provided through the Accountability Management Service. Two generic classes of users are defined, i.e., registered and guest. Registered users are allowed access to services and products beyond those available to guest users. The registration service provides the capabilities for the creation, modification and maintenance of user information. Accountability management services provide subsystem access to end-user information as required for operational use. The following tables define the rules that are used as the basis for identifying the data requirements for User Identification (USERID), password, and user access privileges.

**Table 4.2-1. Business Rules -- User Identification Registration (1 of 3)**

No.	Rule	Questions and Comments
1.	<p>The high level categories of users are characterized as follows:</p> <ul style="list-style-type: none"> <li>• US Government</li> <li>• Educational</li> <li>• Commercial</li> <li>• Non-Profit</li> <li>• Other USA</li> <li>• Foreign</li> <li>• Unknown</li> </ul>	<ul style="list-style-type: none"> <li>• NOTE: These categories support characterization of users requesting products for reporting purposes. They can be derived from the e-mail address (Reference SCRS Report 76-014-05 dated 3/4/96<sup>4</sup>).</li> </ul>

<sup>4</sup> Segment Completion Review System (SCRS) Report 76-014-05, Prepared by Joan Dunham, Sylvia Devlin, BasharAl-Mallah, Aaron Engel

**Table 4.2-1. Business Rules -- User Identification Registration (2 of 3)**

No.	Rule	Questions and Comments
2..	A user can self register thru an HTML Web Interface.	<ul style="list-style-type: none"> <li>• Release B capability</li> <li>• Release A will use Motif based form - V0 client</li> </ul>
3.	A user can self register via E-mail message .	Release B capability
4.	A user can self register by contacting User Services.	Release B capability
5.	A user may register as a guest or as a registered user.	
6.	Release A is preregistering operations personnel & Principal Investigators thru MOTIF interface (i.e. approx. 500 users).	
7.	When registering, a user must supply first name, last name, authentication and either phone or email address.	Reference User Profile rules.
8.	E-Mail address for a registered user is optional.	<ul style="list-style-type: none"> <li>• Verify this rule assumption.</li> <li>• Could it be that one is required if the user orders products but not if just a browser?</li> </ul>
9.	In addition to the required information, a user registering may supply: Title, Middle Initial, Organization, Project, Affiliation, Mailing Address (address, city, state/province, zip/postal code, country), phone, fax, shipping address.	Reference User Profile rules.
10.	When the user request for a USERID is received, the user will be notified (by phone or e-mail) that the information was received.	
11.	User Services reviews the USERID request	
12.	User Services approves the USERID request	
13.	A user is assigned exactly one USERID	<ul style="list-style-type: none"> <li>• Within multiple DCE cells how are unique USERIDs assigned?</li> <li>• Will local User Services assign userids/ passwords/accounts using a global resource?</li> </ul>
14.	The USERID creation date and time and ECS Center ID is required as persistent data.	
15.	Science users probably won't need to have a UNIX userid, unless perhaps they are part of an instrument team. Assuming that UNIX IDs will be required for operations staff.	Verify this rule assumption.
16.	A user has one mailing address at a time.	Verify this rule assumption.
17.	A user has only one default shipping address at a time.	
18.	We will manually validate state code and zip range for North American addresses.	<ul style="list-style-type: none"> <li>• Verify this rule assumption.</li> <li>• Is there a requirement for international address and phone validation ? If so, what?</li> </ul>

**Table 4.2-1. Business Rules -- User Identification Registration (3 of 3)**

No.	Rule	Questions and Comments
19.	Registered users who are pre-approved by ESDIS include: <ul style="list-style-type: none"><li>• Principal Investigator</li><li>• User Services staff</li><li>• M&amp;O personnel</li><li>• Operations staff</li></ul>	<ul style="list-style-type: none"><li>• How are we handling international partners site USERIDs?</li></ul>
20.	The process for obtaining a USERID is the same whether it is done via e-mail, HTML, or User Services.	<ul style="list-style-type: none"><li>• Verify this rule assumption.</li><li>• How are Home DAACs assigned to USERID requests that come in via HTML etc. ?</li></ul>

**Table 4.2-2. Business Rules -- User Privileges**

No.	Rule	Questions and Comments
1.	A USERID is assigned to one or more privilege groups(s).	
2.	A user creation date and time are required as persistent data.	
3.	A privilege group allows one or more users who are assigned to the privilege group to have access privileges at one or more DAACs.	Verify this rule assumption.
4.	User Services will review all requests for privileges from users and verify that the user is who they say they are and are authorized to be given the requested privileges.	
5.	During USERID login validation, privileges associated with a users privilege group will be attached to a "ticket" which will be transmitted to user requested servers while the user is logged on.	
6.	All user account management transactions are logged and audited by Security.	Verify this rule assumption.
7.	User privileges may vary for each DAAC that the user is registered with.	

**Table 4.2-3. Business Rules -- User Passwords**

No.	Rule	Questions and Comments
1.	A user is assigned exactly one temporary password.	<ul style="list-style-type: none"><li>• How is the userid and temporary password initially provided to the user? (slow mail / phone / other?)</li><li>• If the password is temporary, does it matter? (Especially if come thru HTML and EMAIL)</li><li>• Can a user be issued a temporary password over the phone?</li><li>• Is a users USERID validated using single or multiple validation attributes in the lost password case?</li></ul>
2.	When the temporary password is assigned, the creation date and time are required to be stored as persistent data.	
3.	A USERID and a temporary password is mailed to the requesting user's mailing address. The date and time of this mailing is stored as persistent data.	Verify this rule assumption.
4.	A temporary password is valid for one login.	Verify this rule assumption.
5.	A user must process a password change to the temporary password the first time he/she logs onto the system following standard password rules.	<ul style="list-style-type: none"><li>• See the Security Working Group's paper for guidelines on establishing a standard password.</li><li>• The password syntax rules must be made know to the user at the time the temporary password is mailed (or phoned?) to the user.</li></ul>
6.	A user may have only one password for each registered USERID.	

#### **4.2.1.2 Accounts**

Accounts are the basis upon which services are provided to end-users for subscription and order requests for distribution of ECS products. Information that is required by subsystem processes are provided through the Accountability Management Service. Accounts are necessary to provide for billing, distribution of products that require cost reimbursement, accounts receivable and accounts payable processing, and tracking.

**Table 4.2-4. Business Rules -- User Account**

No.	Rule	Questions and Comments
1.	Requests for user accounts must be approved and signed by authorizing personnel.	
3.	A user must have a USERID to be assigned an account.	
4.	At the time the account is established, the date and time are required to be stored as persistent data.	
5.	Some users may have accounts that are not billable.	<ul style="list-style-type: none"> <li>• For example, operations staff?</li> <li>• Verify this rule assumption</li> </ul>
6.	Users who want more than one account must be registered with a unique USERID for each account established.	<ul style="list-style-type: none"> <li>• Verify this rule assumption</li> <li>• Must a user who is registered at other than a home DAAC also have an account related to his/her USERID at the "foreign" DAAC?</li> </ul>
7.	A USERID of "guest" is not billed and does have an account which is NULL.	
8.	A user account has an assigned limit represented in US dollars.	
9.	A user account limit entry requires a date and time that is stored as persistent.	
10.	Charge limit change history is not maintained. (Updates are destructive.)	Since all changes to financial information are logged.
11.	An account is billed to exactly one user account billing location on a billing date.	
12.	An account may contain a prepaid balance.	
13.	An account may not be debited above exactly one account available credit limit.	<ul style="list-style-type: none"> <li>• A credit limit is calculated as the sum of the user account line of credit plus a prepaid balance.</li> <li>• Accounting data will be updated daily while the user's available balance will have to be updated after every order is placed, drawing down the available balance in near real time.</li> </ul>

**Table 4.2-5. Business Rules -- One-time User Account**

No.	Rule	Questions and Comments
1	A one-time user is an individual who requests a product from user services on a one-time basis, but is not given a USERID.	Verify this rule assumption.
2.	A one-time user requests exactly one one-time user account.	
3.	When the request for a one-time user account is made, the date and time of the request is required to be stored as persistent.	
4.	A one-time user is assigned exactly one user account.	
5.	When a one-time user account is established, the date and time is required to be stored as persistent.	
6.	A one-time user account must contain a prepaid balance.	
7.	A one-time user account containing a left-over balance will require a refund.	Verify this rule assumption.

**Table 4.2-6. Business Rules -- Group Account (1 of 2)**

No.	Rule	Questions and Comments
1.	A group account may be authorized on a date by an organization.	<ul style="list-style-type: none"><li>• Verify this rule assumption.</li><li>• Requests for accounts must be approved and signed by authorizing personnel.</li></ul>
2.	The organization address will be the billing address for a Group Account.	
3.	An organization has a company/university name, contact name, mailing address, billing address, phone, fax, but does not have a USERID.	
4.	When a group account is authorized or when an organization provides authorization for a user account to be billed to the group account, the date and time are required to be stored as persistent.	
5.	The creation of a group account is done by SMC Customer Services.	Verify this rule assumption.
6.	An organization may request one or more group accounts.	
7.	A group account can be made inactive by SMC Customer Services upon organization request.	
8.	Once a group account is closed, all orders in process will be completed, no new orders will be taken for the account.	



**Table 4.2-6. Business Rules -- Group Account (2 of 2)**

No.	Rule	Questions and Comments
9.	An organization may modify account credit limits of individual users whose user accounts are part of their group account.	
10.	An organization authorizes zero or more user accounts to charge a group account on a date at a time.	Verify this rule assumption.
11.	A group account has assigned a group account limit.	A group account limit may be less than, equal to, or greater than the sum of the associated user account limits.
12.	When a group account limit is assigned, the date and time are required to be stored as persistent data.	
13.	A group account may contain a prepaid balance.	
14.	A group account may not be debited below exactly one group account limit.	
15.	Payments will be posted against invoice line items and credited to the user account.	

**Table 4.2-7. Business Rules -- Accounts Receivable<sup>5</sup> (1 of 2)**

No.	Rule	Questions and Comments
1.	An accounts receivable invoice (itemized bill) is identified by a unique invoice number.	
2.	When an invoice is created the date and time are required to be stored as persistent data.	
3.	Invoice numbers are generated sequentially.	
4.	Invoices will be sent periodically to organizations and users who have ordered billable products and have an outstanding balance due.	
5.	Invoices will be sent to organizations and users who have ordered products but don't have a balance due.	
6.	When a payment is received from a user, the payment receipt date and time is required to be stored as persistent data.	
7.	Payment types include the following: <ul style="list-style-type: none"><li>• Check</li><li>* Purchase order</li><li>• NASA data order grant</li><li>• Credit card</li></ul>	<ul style="list-style-type: none"><li>• What about money orders?</li><li>• NOTE: Credit card payment is a DAAC unique extension to be implemented by DAACs where this capability already exists.</li></ul>

<sup>5</sup> Accounts Receivable represent the functionality that supports money owed to the enterprise.

**Table 4.2-7. Business Rules -- Accounts Receivable (2 of 2)**

No.	Rule	Questions and Comments
8.	All payments and refund requests will be received by the SMC.	Who has refund decision making authority?
9.	All payments are received in US dollars.	
10.	The SMC will forward all money for EOS products to the Financial Management Office (FMO) for processing.	
11.	The SMC will track reimbursables for external systems through accounts.	NOTE: NASA will perform inter-system account balancing based on SMC account data.
12.	Payments will be linked to the order at the sub-order level.	Verify this rule assumption.
13.	An invoice will be sent to the organization for all user accounts in a group account.	
14.	When an invoice is sent to an organization, the date and time is required to be stored as persistent data.	
15.	Payments made by organizations for group accounts will be applied against the user accounts with the oldest outstanding balance unless otherwise specified by the customer (i.e. the default case).	* Verify this rule assumption. • How is this done?
16.	A payment may be received from an organization for all user accounts in a group account.	
17.	When a payment is received from an organization for all user accounts in a group account, the date and time of the payment receipt is required to be stored as persistent data for the group account and the individual user accounts.	
18.	A product may be sent to a user prior to the receipt of payment. (i.e. a user account may run a deficit not to exceed the line of credit).	
19.	Every product has a pre-established standard price which is identified in the price table.	Verify this rule assumption

#### 4.2.1.3 Subscription

Subscriptions are a convenient means for end-users, who have interest in specific scientific disciplines and their related products, to automatically obtain information in their areas of special interest when these products becomes available. These products may be known future products that are scheduled to be processed<sup>6</sup> or some currently unknown products that may become available in the future.

<sup>6</sup> As referenced in the Science Data Plan.

A definition referenced in 205-CD-002-001 states that a subscription is a request for an action to be taken whenever a particular event occurs. Usually, a request to be notified whenever certain specified data is produced or received under certain specified conditions.

Criteria for the selection of these products is predefined by the interested user as shown in Rule 10. of Table 4.2-7 below. Please note that the rules stated in this proposed specification are preliminary and have not yet been reviewed by the appropriate review authority for verification.

**Table 4.2-8. Business Rules -- Subscription (1 of 3)**

No.	Rule	Questions and Comments
1.	A subscription is dependent upon a pre-established product profile. This may be equated to the virtual metadata or some other mechanism for controlling the internal process of matching the subscription to the production result.	
2.	Subscribers may be: <ul style="list-style-type: none"> <li>• Scientists and other End Users</li> <li>• Instrument Teams</li> <li>• Production Planners</li> <li>• Administrators</li> <li>• User Services</li> </ul>	
3.	Subscribers must have an associated user profile and account.	
4.	A subscription to products is based upon his/her access privileges and account status.	
5.	If a user attempts to subscribe to a product that he/she is not authorized to access (based upon the established privileges) the attempt is logged as an event but is not considered a security violation.	What about Guest users?
6.	If a user attempts to subscribe to a product and there is no billing account, the attempt is logged as an event but is not considered a security violation.	
7.	If the user attempts to subscribe to a product and there is no account or user profile, the subscription is not honored. The user is advised to request that an account be established and to resubmit the subscription after the account is established.	NOTE: This could occur when the user is signed on as "guest".
8	To establish a subscription. The user queries the predefined product profiles from the product profile (production plan? or the virtual metadata?) in order to establish the basis for the subscription.	<ul style="list-style-type: none"> <li>• The basis is used as a match to a production result profile.</li> <li>• In the case of a subscription for interdisciplinary data from an external DAAC archive, are the various production plans accessed through the SMC? Are they queried by the user or must they go through User Services?</li> </ul>

**Table 4.2-8. Business Rules -- Subscription (2 of 3)**

No.	Rule	Questions and Comments
9.	The completion of a production process is the event that establishes the product result profile.	<ul style="list-style-type: none"> <li>• The product result profile is used as the argument for the subscriptions.</li> </ul>
10.	<p>The subscription is tailored to the user defined domain of values and linked to the user profile. These values are added to the pre-established product profile and include:</p> <p>For Data Products:</p> <ul style="list-style-type: none"> <li>• Temporal Extents</li> <li>• Spatial Extents</li> <li>• Product ID</li> <li>• Minimum Acceptable Resolution</li> <li>• Minimum Acceptable Quality</li> <li>• Periodic Schedule (Daily, Weekly, Monthly)</li> <li>• Special world condition (e.g., climatic event, socioeconomic event)</li> </ul>	
11.	<p>The pre-established product profile will allow users to subscribe to automatic orders or notification from user services when any of the following events occur:</p> <ul style="list-style-type: none"> <li>• Product availability (a result of production processes).</li> <li>• Availability of new versions of products.</li> <li>• Product quality assurance status upgrades.</li> <li>• Production Plan availability</li> <li>• Resource Plan availability</li> <li>• New production schedules</li> <li>• Production schedule impacts</li> <li>• Software (algorithm) availability/upgrade</li> <li>• System documentation availability/upgrades</li> <li>• Architecture/configuration changes</li> <li>• Community gatherings (meetings, symposiums, etc.)</li> <li>• Problem resolutions/workarounds.</li> </ul>	<ul style="list-style-type: none"> <li>• A use for Earth Pages or E-MAIL Bulletin Board? (Only one concern: that of nature of announcement confidentiality. Potentially an issue.</li> <li>• These criteria can also be looked upon as the categories of events that would trigger the subscription notice.</li> </ul>
12.	When the PGE process cycle is complete, the subscription request tool is invoked to begin the search for matching subscriptions.	<ul style="list-style-type: none"> <li>• Verify this rule assumption.</li> <li>• Note: The product status code may indicate the current product status.</li> </ul>
13.	The subscription service does not automatically trigger an order when a particular event has occurred that matches the subscription.	<ul style="list-style-type: none"> <li>• Verify this rule assumption.</li> <li>• If it is decided that an order is automatically generated through the subscription process: The order initiation process provides information to the user that an order is pending. The user is also provided the Order ID and the UR.</li> </ul>

**Table 4.2-8. Business Rules -- Subscription (3 of 3)**

No.	Rule	Questions and Comments
14.	The subscription service acknowledges a hit on an open subscription and notifies the subscriber:	Verify this rule assumption.
15.	The subscriber is notified via the following methods: <ul style="list-style-type: none"><li>• E-Mail</li><li>• User Services telephone contact</li><li>• Fax</li><li>• Through next sign-on message</li></ul>	<ul style="list-style-type: none"><li>• Verify this rule assumption.</li><li>• This notification would not be necessary if the subscription automatically triggers the order. This may be an option provided to the user. The order process would provide the acknowledgment/confirmation as required.</li></ul>
16.	The user is provided the capability to request shipment on a pre-scheduled basis (e.g., weekly, monthly).	Verify this rule assumption.
17.	Quality Assurance is a parameter of the tailored subscription which allows the user to request data that has certain minimum QA settings.	Provided these settings are located in the metadata.

#### **4.2.1.4 Order**

An order is created by an interested user via various access methods as defined in the following set of rules for orders. A single order may include one or many different products which are also defined in the following rules. Each product ordered is managed separately, i.e., tracked, scheduled, shipped. Further if several products are available at the time of shipping the products may be packaged together in a single shipment. For Release A, products from a single order that are required to be processed by other than the “home” DAAC, are extracted and submitted as another order to the processing DAAC. The order is managed by the processing DAAC and tracked through direct access to the processing DAAC. For Release B, the order is tracked and managed by the “home” DAAC regardless of where the processing takes place.

**Table 4.2-9. Business Rules -- Order (1 of 5)**

No.	Rule	Questions and Comments
1.	An order may include multiple sub-orders.	NOTE: A sub-order = line-item entry and is the child of the order. Many different products may be ordered within a single order.
2.	All sub-orders are shipped to the same address.	
3.	Each sub-order may be shipped via a different carrier/method.	Verify this rule assumption.
4.	Each sub-order is shipped on the same media.	

**Table 4.2-9. Business Rules -- Order (2 of 5)**

No.	Rule	Questions and Comments
5.	<p>Media that may be specified includes:</p> <ul style="list-style-type: none"> <li>• ftp</li> <li>• 8mm tape</li> <li>• 4mm tape</li> <li>• 9track tape</li> <li>• 3280 disk</li> <li>• 3290 disk</li> <li>• CDROM</li> <li>• CDRec</li> <li>• Floppy</li> <li>• MO</li> <li>• Paper</li> <li>• Film</li> <li>• Video</li> </ul>	<p>NOTE: Reference SEAS Analysis Report<sup>7</sup>.</p>
6.	<p>Products that may be ordered include:</p> <ul style="list-style-type: none"> <li>• Standard and Special Data Products</li> <li>• An entire single Collection/Data Set (generally multiple related granules)</li> <li>• An entire multiple Collection/Data Set (generally multiple related granules that relate granules from more than one single collection)</li> <li>• One or more ECS Data Granules from a collection.</li> <li>• Subsets of a single ECS Data Granule</li> <li>• Ancillary Data</li> <li>• Engineering Data</li> <li>• Correlative Data</li> <li>• Calibration Data</li> <li>• Browse Data</li> <li>• Reference Papers</li> <li>• Guides</li> <li>• Algorithm Packages</li> <li>• Subsets of Algorithm Packages</li> <li>• Workbench and other user workstation tools</li> <li>• System Documentation</li> </ul>	<p>NOTE: Some of the items identified are not billable. These will have \$0 price. However, may incur a shipping cost (TBD verification).</p>

<sup>7</sup> Systems, Engineering, and Analysis Support (SEAS) Report Number 75-014-13 dated 5/30/95

**Table 4.2-9. Business Rules -- Order (3 of 5)**

No.	Rule	Questions and Comments
7.	A sub-order may be submitted for an “on-demand processing” product so long as the product is valid for production scheduling.	<ul style="list-style-type: none"> <li>NOTE: <u>The Level 3 requirement for IMS/PGS from Table 7-3 states:</u>  “...Product orders will include requests for subsetted, sub-sampled, or summary data products that have not been generated at the PGS during standard production processing; therefore, ad hoc processing is required.”</li> <li>NOTE: Services are included as part of the order.</li> </ul>
8.	A sub-order request for a non-available product will automatically generate a production request for “on-demand” processing services and the sub-order status will be updated accordingly.	Verify this rule assumption.
9.	Orders may be requested by guest as well as registered users. Order rejection is based upon log-on authentication in the case of on-line order request, user privileges, and account status (for registered users.)	Verify this rule assumption. <ul style="list-style-type: none"> <li>Security violations that are encountered through the ordering process are logged through the standard authorization and authentication process.</li> <li>How is this implemented for sub-orders where the system must access the data before the security level is known? (Same problem for account status?)</li> </ul>
10.	For a registered or guest user requesting an order by proxy. User services will validate that the user is authorized to place the order before the order is entered.	<ul style="list-style-type: none"> <li>The process of user authentication and authorization will occur prior to the order being entered into the system.</li> </ul>
11.	Orders are requested in various ways including: <ul style="list-style-type: none"> <li>on-line (Release B only)</li> <li>e-mail</li> <li>FAX</li> <li>telephone</li> <li>letter</li> <li>walk-up</li> <li>Subscription (Release B only)</li> </ul>	<ul style="list-style-type: none"> <li>* Release A does not accommodate ordering directly by the user in on-line mode nor does it support the Subscription process. Users will place orders through User Services.</li> <li>The Production Request is a result of an order and not vice versa.</li> <li>NOTE: Orders are tracked in the same manner regardless of how the order is requested.. Reference the Order Tracking Rules.</li> </ul>
12.	For orders processed by proxy, i.e., by User Services, confirmation is required.	<ul style="list-style-type: none"> <li>(Ops Workshop issue) Verify this rule assumption.</li> <li>Is automatic periodic validation of the confirmation status required and how often is this triggered?.</li> </ul>
13.	Where requests for confirmation are required, the notice is sent to the account holder as soon as the last sub-order is stored (order is complete).	<ul style="list-style-type: none"> <li>Verify this rule assumption.</li> </ul> NOTE: The order is committed only after the last sub-order is stored in the database.
14.	If confirmation is not received (see item 11) within a specified number of working days (TBD), another notification to the account holder will be made.	<ul style="list-style-type: none"> <li>Reference Item 9.</li> </ul>
15.	Subsequent to some number of confirmation notices (see Item 12), the system may automatically cancel the order.	<ul style="list-style-type: none"> <li>Reference Items 9 &amp; 13.</li> </ul> NOTE: The number and schedule of notices to be sent are TBD.

**Table 4.2-9. Business Rules -- Order (4 of 5)**

No.	Rule	Questions and Comments
16.	OrderID is assigned at the time the order is received by CIDM and initially processed. This includes orders that are requested via proxy, i.e., User Services.	NOTE: The order number is required under the present design in order to enable tracking the order from the time it is created  NOTE: The necessity of tracking the order object prior to order completion is TBD.
17.	The orderID is unique within the ECS.	NOTE: The orderID is composed of a one-up number concatenated with the ECS Site identifier.
18.	The sub-orderID is also unique within the ECS.	NOTE: The sub-orderID is a concatenation of the orderID plus a one-up number within the order.
19.	The order is stored as an order entity only in the MSS database.	• Verify this rule assumption.
20.	Upon completion of the sub-order entry, the order request system generates a production request and updates the sub-order status.	• Verify this rule assumption.
21.	For Release A : A sub-order for a product that is archived at a location other than the end-user's home DAAC (cross DAAC processing and distribution request) is automatically parsed such that any order relates to all line items that can be satisfied through processing at the same location (DAAC).	• Verify this rule assumption.  • Since the sub-order in question is processed as an order from one processing location to the other, is the number of the referred sub-order unique.? Is it necessary to link cross DAAC orders processed in this manner?  • Which DAAC account is debited?
22.	For Release B, the order may consist of sub-orders that are processed at various other locations (DAACs).	* Verify this rule assumption.  • How does the system interface with the appropriate ECS Processing Site when a sub-order request/status inquiry is made?
23.	The ECS Home DAAC is responsible to maintain status of its orders and sub-orders and support order tracking.	
24.	If a DAAC processes a sub-order for another DAAC, it must provide status of the sub-order to the Home DAAC where the order was entered (the requester's home DAAC).	NOTE: Status is submitted to the Home DAAC as soon as an event related to the sub-order service occurs.
25.	An order that has a status of shipped or canceled is automatically scheduled for on-line purging and off-line archiving in the historical files according to predefined scheduling.	• Similar rule exists for order tracking.  • How is the retention period determined? (Reference Ops Workshop Minutes <sup>8</sup> , for related issues.)  • NOTE: Audit requirements will also demand access to data often older than a year.
26.	When an order is archived, i.e., purged from on-line to off-line mode, an archive object is recorded in the management database along with a date and time stamp, the type of data being archived, and other necessary data required (e.g., UR) to locate the archived data.	* This information is necessary to keep on-line in order to facilitate order tracking in on-line mode. A similar rule is stated in the order tracking business rules.  • Is the UR the means to locate the archived data?
27.	In on-line mode, order requests are honored 24 hours a day, 7 days a week (7X24).	• Since DAACs will not be operational on this schedule how is this supported?

<sup>8</sup> Operations Workshop held January 17-19, 1996 at the Hughes Facility, Landover, MD



**Table 4.2-9. Business Rules -- Order (5 of 5)**

No.	Rule	Questions and Comments
28.	Requests for orders by proxy (via telephone, FAX, e-mail, and letters) are processed five days a week 5X8 M-F, first shift	<ul style="list-style-type: none"> <li>Verify this rule assumption.</li> </ul>
29.	The total order price quote is recorded in the order object (parent).	<ul style="list-style-type: none"> <li>This is mandated by OMB and GAO guidelines. In the case of a pre-paid account, a statement will technically be mailed/issued instead of a bill.</li> <li>Reference OMB Circular No. A-25<sup>9</sup>.</li> </ul>
30.	If the actual price of the sub-order from the pricing table is less than the quoted price, the actual price is used to debit the account .	NOTE: The sub-order price quote must be recorded in the sub-order record to determine this. This is in addition to the total price quote in the parent object.
31.	<p>Account changes subsequent to a not-yet-shipped order may automatically affect the order/sub-order. This includes:</p> <ul style="list-style-type: none"> <li>User requested changes in the default shipping address</li> <li>User requested changes in the default shipping mode (FEDEX, U.S. Postal Service, etc.)</li> <li>Changes in the default shipping charge information(FEDEX, U.S. Postal Service, etc.)</li> <li>Changes in user's secure data access privileges.</li> <li>Non-availability of requested data (disaster, non-recoverable data fault)</li> <li>Change in security level of data product ordered which is no longer compatible with account holder's user access privileges</li> </ul>	<ul style="list-style-type: none"> <li>Verify this rule assumption.</li> <li>NOTES: This rule affects order processing functionality. It has been forwarded to the appropriate design team. Note: that this may require project decision and verification.</li> </ul> <p>Users are not billed until the product is shipped. But the account changes would affect the price estimate which in turn affects the User Profile balance. And since we will probably bill the user the exact amount of the price estimate (except for large custom jobs), an account adjustment may need to be performed - if ESDIS policies so dictate.</p> <p>A sample policy directive, is simply to honor the charges in the price estimate at the time the order was placed and not worry about adjusting the charges. This may all be a moot point, when the shipped data request notification reaches the Billing and Accounting system, the system may depending on its implementation, use the "new" (current) account information and assess applicable charges based on this current account information.</p>
32.	The user account is debited when the order is placed.	<p>Verify this rule assumption.</p> <p>NOTE: Reference OMB Circular No. A-25</p>
33.	Orders for V0 products may be requested through the V0 Gateway.	<ul style="list-style-type: none"> <li>Verify this rule assumption.</li> </ul> <p>NOTE: Assumption was made from cursory review of 305-CD-023-002</p>
34.	V0 orders can be requested for science data only, i.e., The collection and/or granule UR is sent to the Gateway and resolved there. This means that guides, software, and all other items listed in item 5. above cannot be directly ordered from the ECS client.	<ul style="list-style-type: none"> <li>Verify this rule assumption.</li> </ul> <p>NOTE: Assumption made from cursory review of 305-CD-023-002</p>

<sup>9</sup> Office of Management and Budget / Executive Office of the President, Revised Circular A-25, July 8, 1993, Subject: "User Charges"

#### 4.2.1.5 Order Tracking

Order tracking is inquiry against the status of the order or a particular sub-order. Order status is recorded in the MSS database and linked to the order via the order/sub-order keys. Each request for order status is logged to provide information on system usage and performance. Also this information is used for historical reference.

**Table 4.2-10. Business Rules -- Order Tracking ( 1 of 4)**

No.	Rule	Questions and Comment
1.	Order tracking provides information related to product order status and the ordered items (e.g., shipping addresses, cost, production schedule)	<ul style="list-style-type: none"> <li>For Release A, the order status must be queried through User Services .</li> <li>User Services may query all orders located at other DAACs.</li> </ul>
2.	Status for billing and accounting are outside the scope of order tracking.	<ul style="list-style-type: none"> <li>Reference the Ops Workshop Minutes<sup>7</sup> .</li> </ul>
3.	Requests for information related to the order may be initiated in various ways including: <ul style="list-style-type: none"> <li>on-line (Science User access not in Release A)</li> <li>e-mail</li> <li>FAX</li> <li>telephone</li> <li>letter</li> <li>walk-up</li> </ul>	<ul style="list-style-type: none"> <li>Release B will accommodate Science User on-line access for order tracking.</li> <li>Can status inquiry against a subscription invoke order tracking in Release B?</li> </ul>
4.	Order information may be requested by the following users: <ul style="list-style-type: none"> <li>Order originator</li> <li>Any science user having a registered USERID (not "guest" related to the account of the order (not Release A)</li> <li>Group account holders (Organization)</li> <li>Sustaining Engineering and Administrative Staff including the following functions: <ul style="list-style-type: none"> <li>User Services</li> <li>Software and database maintenance (not Release A)</li> <li>Other administrative (DAAC, SMC) (Auditors, Accountants, Billing Clerks, etc.) (not Release A)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>* Verify this rule assumption.</li> <li>* Questions include: <ol style="list-style-type: none"> <li>Can a "guest" order products with media? If so how is the account handled? Who can inquire on these orders subsequently?</li> <li>Is User Services provided "trusted" or "super-user" authority among DAACs where home user orders are split out? (i.e., can user services at DAAC A inquire on orders at DAAC B?)</li> </ol> </li> <li>NOTES: <ul style="list-style-type: none"> <li>More specific roles than "other administrative types" may need to be defined (i.e. Billing Clerk investigating a discrepancy, DAAC Accountant to verify/approve an action)</li> <li>Release A supports only User Services access to the Order Tracking Tool.</li> </ul> </li> </ul>
5.	The order tracking tool is automatically invoked for all on-line access of order information.	NOTE: An ICON may have to be selected by a User Services Representative.

**Table 4.2-10. Business Rules -- Order Tracking (2 of 4)**

No.	Rule	Questions and Comment
6.	When order information is requested, the order tracking tool is invoked. One function of the tool is to automatically log a time and date stamp along with data required for summary statistics for each inquiry.	<ul style="list-style-type: none"> <li>• Order tracking is recorded as an event. For Release A this information will be manually recorded by User Services. Log will be made when the query is made. The tool will probably be up and running on the User Services Desktop at all times.</li> </ul>
7.	The process of order tracking may be executed to access all current (on-line) and historical (off-line) order information. The tracking procedures differ for on-line vs. off-line data.	<p>NOTES:</p> <ul style="list-style-type: none"> <li>• The order tracking tool is being developed in Release A.</li> <li>• How is tracking an archived order designed? Will this require the reloading of the information to the database?</li> </ul>
8.	When an order is archived, a record of the transaction is recorded in the management database along with a date and time stamp, archive address, and other data (e.g., OrderID, UR) required to locate the information.	<ul style="list-style-type: none"> <li>• The entire database from a given time to a given time will be archived. This will be done through data server and will contain the start and end dates of the archive. It is expect that at least 1-2 years or information will be kept on line.</li> </ul>
9.	An on-line request for information for an archived order will be responded to in other than on-line mode. This information may be requested for a group of orders initiated by a specific userID or charged to a specific single or group account number.	<ul style="list-style-type: none"> <li>• Audit requirements will demand access to data older than a year.</li> <li>• A printed report (batch processing) of the information in the archive (e.g., the date of the order, when it was processed/shipped, date of archive, and other related information) will be made available to the person making the inquiry.</li> </ul>
10.	An order with a shipping date older than the specified retention period is automatically scheduled for on-line purging and off-line archiving in the historical files. This is accomplished in batch mode according to a pre-defined schedule.	Reference Ops Workshop Minutes, for related issues that require policy decision (e.g., retention periods, schedules)
11.	Historical information for archived orders (orders canceled or shipped that are older than the retention date) may be requested in various ways similar to orders less than one year old.	Verify this rule assumption.
12.	Order status requested in on-line mode may be responded to in on-line (conversational mode) for current (not archived) outstanding orders and already shipped or canceled orders.	<ul style="list-style-type: none"> <li>• Release B only</li> <li>• Inquiry support through User Services proxy in Release A</li> </ul>
13.	If a request for order information is responded to in other than on-line mode, manual entry of log data is part of User Services procedure.	Verify this rule assumption.

**Table 4.2-10. Business Rules -- Order Tracking (3 of 4)**

No.	Rule	Questions and Comment
14.	Only on-line users are automatically authenticated. All other requests processed through User Services are manually authenticated.	Verify this rule assumption.
15.	Externally generated inquiries for information on orders that are not related to the requester's account are not honored and are considered a security violation.	<ul style="list-style-type: none"> <li>• Verify this rule assumption.</li> <li>• NOTE: There is no capability in the Release A version of DCE to accommodate proxy login (for group administrators). This capability is projected as a future release (beyond Release B) feature.</li> </ul>
16.	Security violations encountered through order tracking are logged with user-id, time and date stamp and information requested.	<p>Verify this rule assumption.</p> <p>*NOTE: What constitutes a security violation requires some finalization.</p>
17.	The order tracking system will not accommodate any changes to an order. This also means that account information may not be changed and orders may not be canceled through the order tracking tool.	NOTE: It appears that the data server and client functionality do not include a way to modify most of the order data from any tool!
18.	<p>If the person requesting status of an order does not know the order access information (e.g., order number), all order numbers and dates of orders are returned to the requester for the related USERID, Account Number, or Name.</p> <p>This transaction is counted as a single transaction for logging purposes.</p>	NOTE: For Release A: the request is made for the user by User Services with the search arguments being the requester's name, account number or USERID.
19.	<p>Sub-order status is stored through event notification and is related to the sub-order. Examples of events are:</p> <ul style="list-style-type: none"> <li>• Order request is received and entered</li> <li>• Order is shipped</li> <li>• Order shipment is lost</li> <li>• Order has been billed</li> <li>• Order payment is received</li> <li>• Automatic change in order information</li> </ul>	<p>Verify this rule assumption.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• OPS workshop 1996 has an action item to identify the order states.</li> <li>• Order tracking does not currently contain pricing information.</li> </ul>
20.	<ul style="list-style-type: none"> <li>• All order status requests and event notifications are logged.</li> </ul>	
21.	<ul style="list-style-type: none"> <li>• In on-line mode, order tracking is honored 24 hours a day, 7 days a week (7X24).</li> </ul>	
22.	<ul style="list-style-type: none"> <li>• Telephone inquiry, FAX, e-mail, and letters are replied to five days a week 5X8 M-F, first shift</li> </ul>	
23.	If response is in other than on-line mode, information is made available within a specified number of working days.	<p>Verify this rule assumption.</p> <p>NOTE: Expected response time is TBD.</p>

**Table 4.2-10. Business Rules -- Order Tracking (4 of 4)**

No.	Rule	Questions and Comment
24.	If information is not returned to the requester within the specified number of working days, a record of the reason for delay is recorded in the associated sub-order status .	Verify this rule assumption.  NOTE: Number of days is dependent upon Project decision on item 23.
25.	Partial order information is supported, i.e., complete order status or sub-order status.	Verify this rule assumption.
26.	A record of how many requests against an ordered product are maintained in the management database as statistical data for management reporting.	These statistics could be used to create a more efficient process/query. The information from these statistics can be used to manage performance in regard to system response.

#### **4.2.1.6 Ingest**

Data is ingested from external data providers (e.g., SDPF, TSDIS, NOAA/NESDIS) and VO data migration. The business rules for Ingest included in Table 4.2-10 are based on the Requirements trace in 305-CD-025-002, "Release B SDPS Subsystem Design Specification", March 1996. Please note that the rules stated in this proposed specification are preliminary and have not yet been reviewed by the appropriate authority for verification.

**Table 4.2-11. Business Rules -- Ingest (1 of 4)**

No.	Rule	Questions and Comments
1.	Each request for data ingest has a unique Request Identifier.	
2.	Each Request for data to be ingested is stored in the MSS database and contains the following data; <ul style="list-style-type: none"><li>- Request Identifier.</li><li>- USERID of Requestor.</li><li>- Ingest start date and time.</li><li>- Ingest end date and time.</li><li>- External Data Provider.</li><li>- Data type identifier.</li><li>- Ingest data volume.</li><li>- Number of ingest data sets.</li><li>- Number of data files.</li><li>- Archive location.</li><li>- Expected run time to process.</li><li>- File media.</li><li>- Source file address/location.</li><li>- Description/Special Instructions.</li></ul>	NOTES: The ingest start date and time and end date and time are the window of opportunity for data ingest and may not represent the actual start and stop dates and times.  The USERID of Requestor may be an application.

**Table 4.2-11. Business Rules -- Ingest (2 of 4)**

No.	Rule	Questions and Comments
3.	The data ingest process working storage is logically and physically separate from other ECS working storage.	
4.	Level 0 data ingest processing has a very high priority.	NOTE: This priority assumes a high level of Reliability, Maintainability, and Availability (RMA).
5.	Data to be ingested from an authorized data provider takes priority over data to be ingested from an authorized science user.	
6.	Each external interface to the ingest process is supported by a different data transfer mechanism and a different template.	NOTE: Data transfer mechanisms address format conversion, quality checking, metadata definition, and other required characteristics.
7.	Ingest supports Version 0 migration and conversion to EOS-HDF.	
8.	Ingest supports the extraction of standard metadata for data server update.	
9.	Ingest input data is transferred through the following electronic media:: <ul style="list-style-type: none"> <li>- Interactive (network file transfer)</li> <li>- Hard Media</li> <li>- 8mm tape</li> <li>- 8mm cartridge tape</li> <li>-</li> </ul>	NOTE: A data collection may contain many granules
10.	Receipt of a network ingest request creates an MSS event log entry.	
11.	Response to a network ingest request creates an MSS event log entry.	
12.	The data provider for ECS data ingest is a registered user within ECS.	NOTE: The ingest process will authenticate the provider of a Network Ingest Request
13.	Any data provider or science user submitting data to ingest that is not registered will be denied access and a security violation will be recorded in the MSS event log.	This is stated in the Ingest Requirements Trace as an entry to the Error Log. Is this correct?
14.	Any data provider or science user submitting data to ingest who is not an authorized agent to submit data will be denied access and a security violation will be recorded in the MSS event log.	
15.	Ingest supports a maximum of 300 transactions per day.	
16.	Ingest operates on a 24X7 work schedule.	There is no requirement for staffing on a 24X7 schedule. How is this supported?

**Table 4.2-11. Business Rules -- Ingest (3 of 4)**

No.	Rule	Questions and Comments
17.	All errors encountered during the Ingest process will be recorded as MSS event log entries.	305-CD-025-002 for Ingest states this is to be written to an error log. Which error log? MSS? Application?
18.	Processing status for ingest recorded in the MSS event log will be reported to the data provider.	
19.	Other event log entries include; <ul style="list-style-type: none"> <li>- Receipt of an unexpected message from the ingest provider.</li> <li>- Detection of invalid information on a message received from the ingest provider.</li> <li>- Communication failure</li> <li>- File transfer failure.</li> <li>- Data conversion failure.</li> <li>- Archive failure.</li> <li>- Missing file headers.</li> <li>- Detection of discrepancies between the number of the file(s) received and the specifications in the ingest request.</li> <li>- Start date and time of all ingest processes.</li> <li>- End date and time of all ingest processes.</li> <li>- Invalid data type identifies.</li> <li>- Missing required metadata id.</li> <li>- Metadata parameters out of range.</li> <li>- Processing status.</li> <li>- Aborted processing.</li> <li>- Suspended processing.</li> <li>- Resumption of suspended processing.</li> </ul>	It is unclear as to whether or not the sub entries relate to the MSS or Application log.
20.	There is a test mode provision for the ingest process that is off-line.	
21.	The ingest process is automatically activated, via polling, for any outstanding request for data.	
22.	Authorized operations staff will manually set the period delay for automatic polling for data request delivery.	
23.	A window of time is allocated for data ingest process to start.	
24.	Any process started after the time window closes will be automatically aborted.	
25.	The data volume for each file in the list of granule files is stored as persistent data in the MSS database.	NOTE: This information is required for capacity management.
26.	Operations staff are responsible to monitor and support data ingest thresholds.	

**Table 4.2-11. Business Rules -- Ingest (4 of 4)**

No.	Rule	Questions and Comments
27.	An ingest request may be canceled by an authorized agent.	
28.	An ingest process may be suspended for later resumption or cancellation by an authorized agent.	
29.	An ingest process may be requested, canceled, suspended, or resumed by authorized agents.	
30.	<p>Thresholds are maintained by authorized operations staff for the following:</p> <ul style="list-style-type: none"> <li>- Total number of ingest requests to process concurrently.</li> <li>- Number of ingest requests for each external data provider to process concurrently.</li> <li>- Total volume of data to ingest concurrently.</li> <li>- Volume of data for each external data provider to ingest concurrently.</li> <li>- Number of data transfer retry attempts for each external interface to ECS.</li> </ul>	
31.	<p>Ingest performs data and metadata conversion for the following known data types:</p> <ul style="list-style-type: none"> <li>- NMC GRIB data (Data Server)</li> <li>- PB5 time (ECS standard date/time formats).</li> <li>- Binary integer values (ASCII integer format).</li> <li>- Binary floating point values into ASCII floating point format.</li> <li>- Metadata parameters stored in HDF format</li> <li>- Dataset-specific metadata formats.</li> </ul>	
32.	<p>An Ingest History log is maintained in the MSS database containing the following information:</p> <ul style="list-style-type: none"> <li>- Start date and time.</li> <li>- Stop date and time.</li> <li>- Request identifier</li> <li>- External Data Provider</li> <li>- Final Service Request Status.</li> <li>- Data Type Identifier.</li> <li>- Ingest Data Volume</li> <li>- Number of data sets.</li> <li>- Number of data files.</li> </ul>	



## 4.2.2 Assumptions

As we designed and developed the Conceptual Model, we made certain assumptions in order to determine what the business rules were and what they implied. We have captured these assumptions here so that they can be verified by the project team.

The assumptions are organized by the functional areas shown in Section 5.

Accounting Substructure	A user is assigned exactly one account. That account has at most, one billing location.
	It is assumed that Account ID's are not "recycled" to other customers after being closed.
	It is assumed that there is no interest in recording a history of the changes in account state, but that only the current account state is of interest.
Trouble Ticketing / Fault Management Substructure	It is assumed that Trouble Ticket identifiers will be generated and assigned by the ECS Centers.
	It is assumed that an Item may only cause a fault in at most, one system.
Training Substructure	It is assumed that either ECS employees are the only individuals who attend training courses, or that there is only an interest in recording facts about ECS employees who attend training courses
	It is assumed that a given curriculum may be revised from year to year.
	It is assumed that certifications are given only after the completion of curricula, rather than for the completion of training courses.
	It is assumed that only ECS employees receive certification.

## Inventory Management Substructure

Items will be assigned a unique identifier by the SMC.

The alternative is to have each ECS location assign identifiers. If the alternative is chosen, then from the enterprise viewpoint, items are distinguished by knowing the assigned item identification and the ECS location that assigned the item identifier, since it is possible that two or more ECS locations may by chance, assign the same identifier to different items, and by doing so, create a logical contradiction. The assumption that items will be assigned identifiers by the SMC is based on the understanding that all operating components of the system are property of Goddard Space Flight Center.

Items will not be assigned local ECS identifiers in addition to the item identifier assigned by the SMC.

Each item manufacturer will be assigned a unique identifier by the SMC.

It may be determined after examining the data pertaining to item manufacturers, that Manufacturer-Name is a unique identifier, in which case the practice of generating and assigning Manufacturer-ID's may be discontinued.

Item Assembly assumes that only the current state of assembly is of interest. As changes in assembly are made, the previous state of assembly is overwritten ( a destructive update). It should be noted that this pertains to all types of items, hardware, software, document, and any other to be determined.

The Delivery Media entity primarily concerns any internally generated software or information product that is available for distribution to users or customers, which has been assigned a distinct identifier by the SMC. It may also be used to indicate the varieties of media on which a particular commercial product is distributed that is property, and a component of the system, however the reasons for wanting to record such information is unclear.

It is assumed that only one person maintains a given item, or that there is only an interest in recording the identity of the person who is responsible for maintaining a particular item, regardless of the actual number of individuals who may have been involved.

It is assumed that a given manufacturer may have more than one location about which there is an interest in recording information.

	It is assumed that a given vendor may have more than one location about which there is an interest in recording information.
	It is assumed that a vendor may have more than one point of contact about which there is an interest in recording information.
	It is assumed that there is an interest in recording facts about the receipt of consumable items.
Configuration Management Substructure	It is assumed that a distinct configuration baseline will be maintained for each ECS Center, and that a given value of Configuration-Baseline-ID may be used at more than one ECS Center.
Generic / User Substructure	It is assumed that all user identifications will be assigned by the SMC.  A user may establish more than one account.
In General	COTS packages that will be procured will support the stated rules. COTS packages will be tailored to include capabilities as defined by ECS requirements.

## 4.3 Methodology

### 4.3.1 The Three Schema Approach<sup>10,11</sup>

Distributed Database Management System (DDBMS) modeling traditionally adheres to a three schema approach to data integration. Within an enterprise, the data is identified and the relationships of the data and their specifications are logically organized using the concepts derived from the three schema approach. This provides a convenient way to convey to developers, system managers, configuration control boards, and end-users both the substance of the data in the system as well as the functional capabilities of the system itself.. These logical models are always platform independent so that the data and software can be tailored at the time of implementation for specific platforms.

This paper uses the term "model" in lieu of "schema" to identify the three logical entities in this modeling approach. The characterization, however, remains the same.

<sup>10</sup> Reference: S. Bhalla, E. Prasad A. Gupta, S. Madnick, A Framework and Comparative Study of Distributed Heterogeneous Database Management Systems': A.P. Sloan School of Management, MIT Industrial Liaison Program, Report # 5-45-88

<sup>11</sup> Reference: D. Tsichritzis, A. Klug, The ANSI/X3/SPARC DBMS Framework Report of the Study Group of Database Management Systems, Pergamon Press, 1978

#### **4.3.1.1 The Conceptual Data Model**

The conceptual data model represents the data assets of the organization, illustrating the data relationships and specifying the attributes which have been normalized, generally to third normal form (The rule for achieving third normal form is stated as: 'Each attribute must be a fact about the key, the whole key, and nothing but the key'<sup>12</sup>). The model is usually accompanied by a data dictionary containing the characteristics of these attributes (also known as fields or columns), and a list of business rules which are the basis for the relationships. This model is the subject of this document.

#### **4.3.1.2 The Internal Data Model**

The internal data model is synonymous with the physical schema. This is the platform dependent implementation. It is reasonable to assume that entities and conceptual objects representing facts about entities may have a longer life than the technologies upon which hardware and software implementations are based. By keeping the Conceptual and External models separate from the Internal model, the hardware and software technologies may change without significant impact on the system. The information necessary to generate the internal schema is included in the CSMS Data Specifications in Section 6.2 and is initially presented as the normalized version until it becomes fully developed to support object implementation. This information will be used to create the vendor dependent database schema when required. The current system design will use the Sybase Database Management System. This DBMS is implemented using relational tables.

#### **4.3.1.3 The External Data Model**

The external model is a logical model that represents the views of the enterprise's data as perceived by the end user. These models are the user's windows into the database, where the "user" in some cases may be a software application. For physical implementation, these views are further decomposed into various scenarios illustrating the query capability of the system. This external model will be found in Section 7 of this document. More details can be found in DID 305 (references are contained in Section 2).

### **4.3.2 Database Design Approach**

An "Enterprise" approach to data modeling is chosen to represent the structure of the CSMS data within the EOSDIS Core System (ECS). This approach addresses the data from the viewpoint of the entire enterprise, i.e., ECS, rather than from a particular subsystem or substructure of the enterprise. It is a system of graphics and specifications that are generalizations and abstractions of facts, each of which asserts something about the state of being of a component of the system at various levels of decomposition. It's basis is the interpretation of the predefined set of business rules<sup>13</sup>, reference Section 4.2.1.

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<sup>12</sup> Reference: Wiorkowski and Kull, "DB2 Design & Development Guide"

<sup>13</sup> Business rules represent the policy and procedures statements of the business enterprise. It is the guideline to the way the enterprise conducts its business processes and identifies the way the customer or user is permitted to use the resources of the business. The system design and architecture is based upon these rules.

The CSMS "Enterprise" view of the data encompasses all system management data, regardless of its place of origin. The structure of the conceptual model results from logical dependencies that are found to exist when the business rules are evaluated collectively. These relationships are defined in terms of the "Entity Relationship Rules" as found in Section 5.2.2 of this document. It is assumed that they are true, and free of logical contradictions, however in preliminary models such as that represented by the conceptual model, subsequent analysis is expected to find that some of the sentences are not always true, and that some contradict others. As flaws in the model are revealed through subsequent analysis, changes will be made to the conceptual data model that will drive the updates to the internal and external models. This approach maintains consistency within and between the system components throughout its life-cycle. It is also used as a means to convey the ECS system's management data to the subsystem developers and maintainers and to the every day users of the system.

The steps involved in the design process for the conceptual model are iterative and summarized and generalized as follows:

- Initially, the process ground rules are developed. This includes the administration of the task which includes defining the points of contact for information, identification of the tools and standards that are to be used to develop the product, provision of needed training, tool implementation, breaking down the tasks into manageable units, organizing the tasks according to schedule, and assignment of the tasks.
- The next essential step is to gather the appropriate available documentation .
- Next, the design begins with identifying the high level functional areas for which the data is managed (e.g., Account, Trouble Ticket, Order Tracking, Training). This is accomplished through review of the Requirements, Business Rules, and System Specifications.
- Analysis is accomplished next to decompose each functional area identified previously into entities, or classes of data and to identify the functional relationships among the areas.
- The functional areas and entity relationships are defined and documented.
- The next step in the process is to analyze the areas and relate the smallest addressable and meaningful units of data that are applicable to enable the system to function. This smallest addressable unit is the "attribute" which is meaningfully named according to some predefined standard.
- The attributes are associated with the appropriate entity through data normalization.
- Key values are identified as attributes for each of the entities by analysis of the entity.
- Finally, the properties of those entities, and their associated "attributes" are identified. These properties are the information that describes the attribute.
- How, and in what magnitude, these entities are "related" to one another is modeled. These are represented as cardinality and dependency.

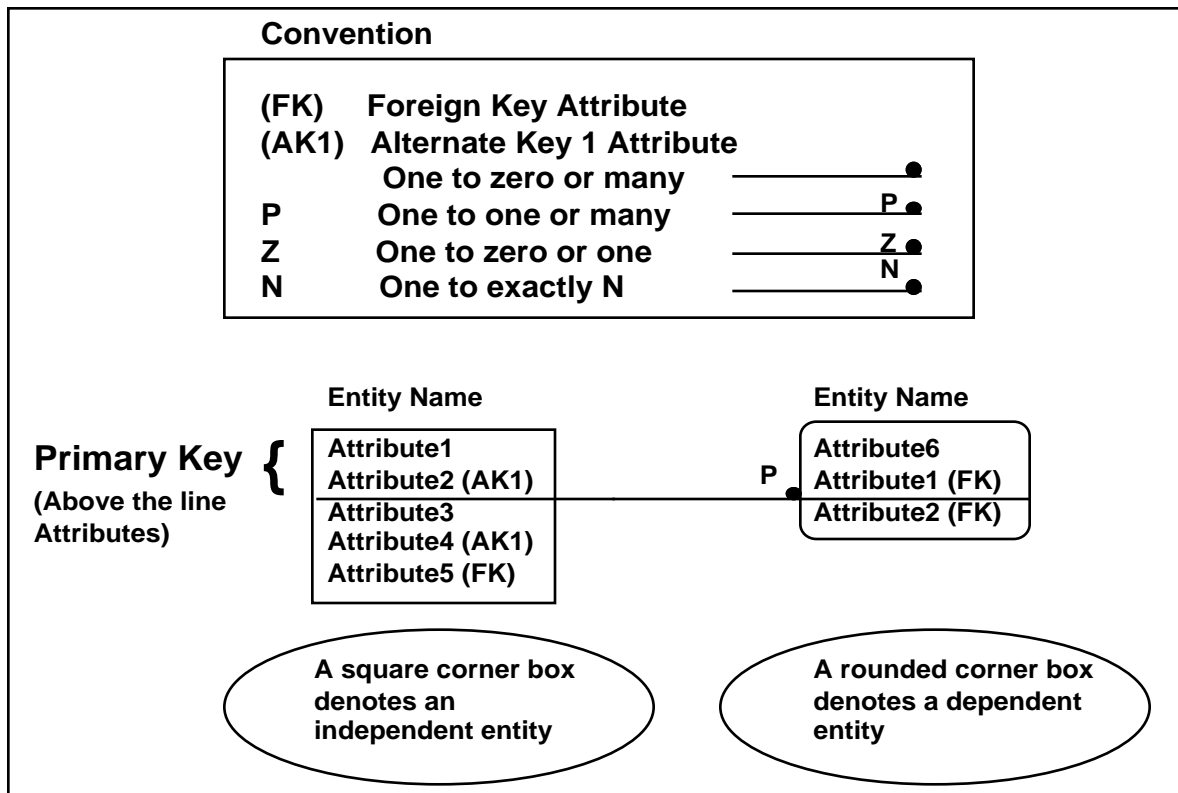
- A sizing analysis is accomplished based upon the number of bytes associated with the normalized attributes in the model. Sizing is further refined through specification of cardinality (number of expected occurrences of the entity). This sizing supports the design of the database schema or the internal model which is a platform dependent design. Once the internal model is designed and the distribution of the data is determined, another sizing analysis is performed to identify storage capacity requirements for the data. Information on sizing of the Management databases can be found in DID 305.
- The final step in the process is the critique of the design by system organizations outside the data engineering organization. As feedback is acquired through model verification the design is updated.

### **4.3.3 Subsystem Coordination**

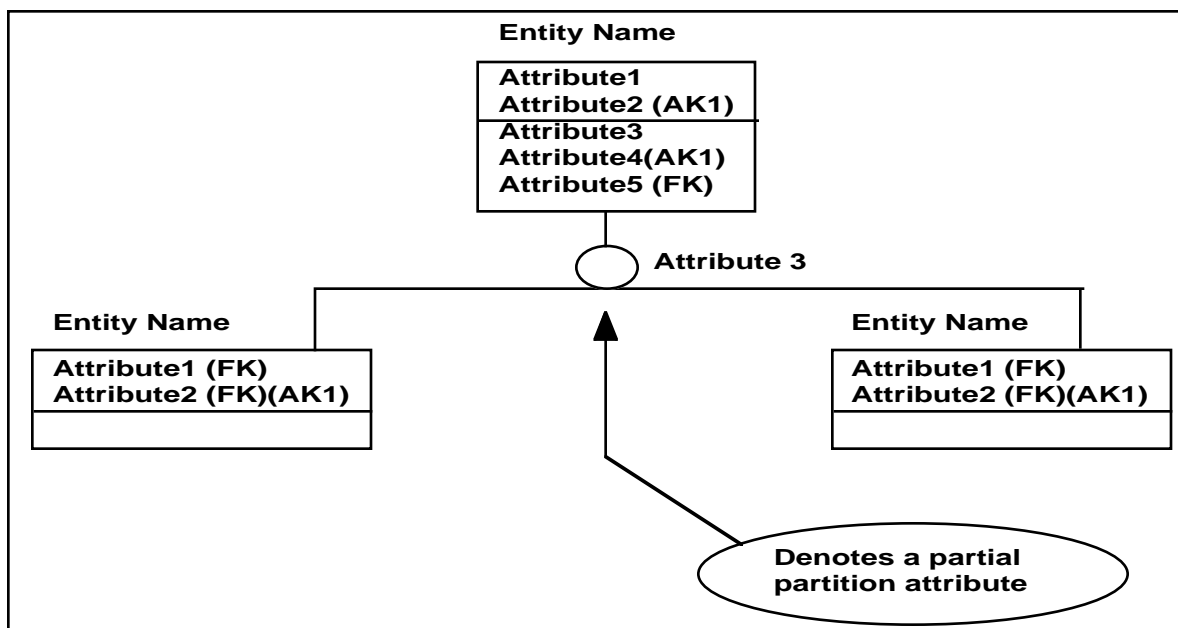
As the data model and specifications are analyzed, the subsystems ESDIS project personnel, and DAACs are invited to review the material for correctness, scope, and clarity. This provides the data engineering staff with valuable feedback to verify and validate the data design. This has been accomplished for CSMS through numerous meetings and the OPSCON workshop and telecoms. Mappings of the conceptual model to the logical objects as appear in the MSS DID 305 subsystem design document is accomplished to uncover anomalies which are coordinated with the subsystem developers as a means to keep the enterprise data design consistent with the system design.

## **4.4 Standards Used**

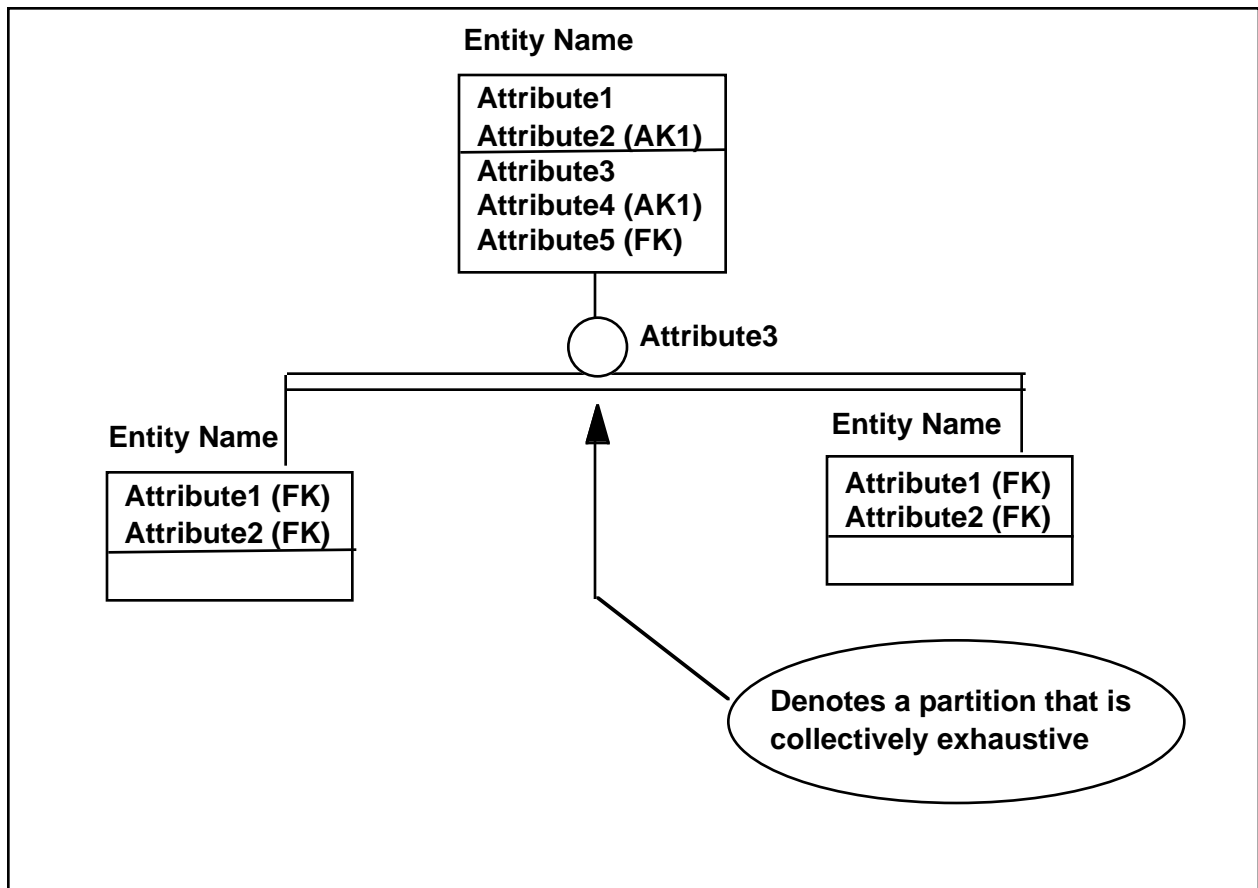
The Federal Information Processing Standard 184 (December 21, 1993) is used as the diagramming convention for illustrating the MSS Enterprise Data Model. This convention is shown in Figures 4.4-1 thru 4.4-3 as a guide to reading the diagrams presented in Section 5 which describe the entities and entity relationships. The illustrations in the following three figures are instructional, i.e., they do not represent any particular subject area such as configuration management or maintenance.



**Figure 4.4-1. The FIPS 184 Convention for Entity-Relationship Diagrams  
(1 of 3)**



**Figure 4.4-2. The FIPS 184 Convention for Entity-Relationship Diagrams  
(2 of 3)**



**Figure 4.4-3. The FIPS 184 Convention for Entity-Relationship Diagrams  
(3 of 3)**



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## 5. CSMS Conceptual Data Model

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### 5.1 Introduction

This section contains the current version of the MSS Enterprise Data Model for the CSMS presented by Functional Area. An "Enterprise Data Model" is a representation of the structure of a system of sentences that are generalizations of facts, each of which asserts something about the state of being of an enterprise from the enterprise viewpoint, i.e. from the viewpoint of the entire enterprise rather than from a particular subsystem or substructure of the enterprise. The CSMS "Enterprise" view of the data encompasses all system management data, regardless of its place of origin. The structure of the sentences results from logical dependencies that are found to exist when the sentences are evaluated collectively. These sentences are termed "Entity-Relationship Rules". It is assumed that they are true, and free of logical contradictions, however in preliminary models such as that represented in this section, subsequent analysis is expected to find that some of the sentences are not always true, and that some contradict others. As flaws in the model are revealed through subsequent analysis, changes will be made to the data model to maintain consistency with the current understanding of the meaning of the ECS system's management data.

The CSMS Entity Relationship Diagram (ERD) is a model of the entities (things/classes/objects) that are managed by the CSMS system. Examples of high level entities might be Account or Trouble Ticket. These high level entities are further decomposed to identify the associated attributes of the entity.

The CSMS Conceptual Data Model discussed in this section consists of three parts:

- a high level view of the CSMS Functional Area Entities
- detailed Entity Relationship Diagrams by Functional Area
- data attribute specifications (Data Dictionary)

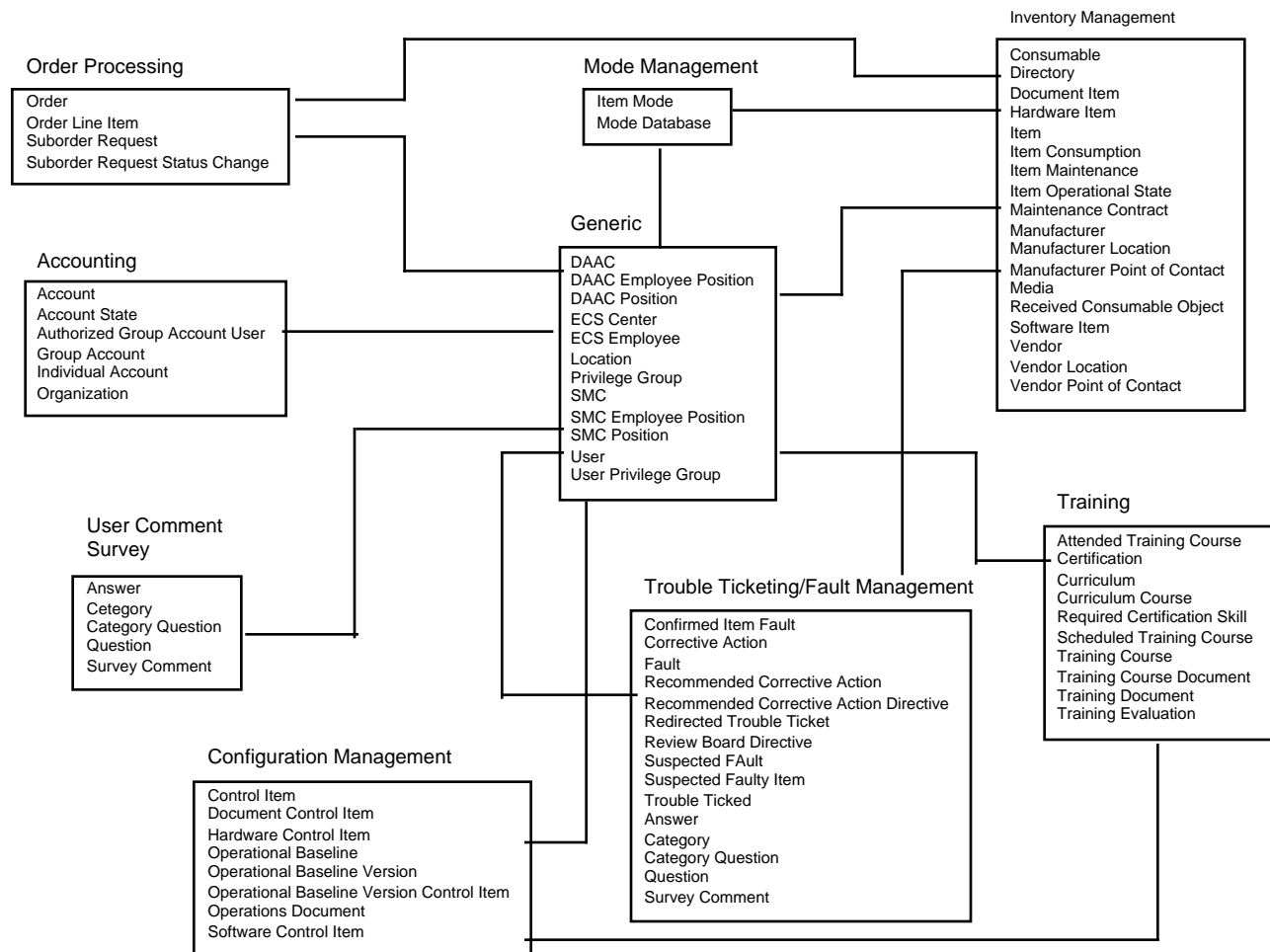
The CSMS conceptual model data specifications (formerly identified as the data dictionary) are presented to define the properties of the attributes including the definition of the attribute, the location of the attribute within the ERD, the domain (valid values of the data that will be stored) and a description of these values, and alias names as they appear in the DID305.

### 5.2 The CSMS Functional Area Entities

The model is presented at a high level to illustrate the conceptual data structures and their relationships so that the model can be graphically visualized at a glance. The decomposition of this model is a subsequent step during the design process to further analyze, normalize, and allocate specific data to the appropriate functional data entity. This decomposed model is presented in Section 5.3. The functional area entity relationship diagram is presented in Section 5.2.1, the Entity Relationship Rules in Section 5.2.2, and the Entity Definitions in Section 5.2.3.

## 5.2.1 The Functional Area Entity Relationship Diagram

Since the Conceptual Entity Relationship Diagram is so large that it can not be presented on one page in this document, we have condensed it into a one page functional Entity Relationship Diagram shown in Figure 5.2-1. We have included this diagram here to provide the reader with a 'birds eye view' of the data presented in Section 5.3. In this diagram, each block represents one functional area, and included in each block are the names of the entities represented in detail in Section 5.3. Lines between these high level functional areas represent one or more entity relationships rules between the functional areas. For clarification on what these relationships are, please refer to the Entity Relationship Rules in Section 5.2.2 and the appropriate figure in Section 5.3.



**Figure 5.2-1. Functional Entity Relationship Diagram**

## 5.2.2 Entity Relationship Rules

CSMS Entity-Relationship Rules are those statements which are derived from formally stated business rules, as identified in Section 4.2.1. By clear definition of the business rules for managing the business or the project, we can identify the information necessary to formulate the parent child relationships and the cardinality of those relationships. This information can then be used to formulate the components of the ERD.

These rules will be of three main types. Each is itemized and is illustrated with a hypothetical example below:

- First, there will be declarative statements about modeled objects. As example, "A user has a last name and a privileges code" might be a declarative statement about something being modeled in the CSMS system. Similarly, the business rule "A mis-keyed password is a type of a security violation" would be a statement about one way a security violations will need to be catalogued.
- Second, entity-relationship rules will be "validation" constraints on modeled objects. As example, "A user's last name must always begin with a capital letter" reflects a validation-constraint rule. Or, the business rule that "A user's account expiration date must be no less than 90 and not more that 180 days from the start date" reflects a rule as to how accounts will be managed and also identifies the domain values of the attribute.
- Finally, the entity-relationship rules will be formula constraints on specific entities of modeled objects. As example, "The ifInboundPkts is the sum of ifInUcastPkts + ifInNUcastPkts + ifInErrors + ifInUnknown Protos" would reflect a business rule about how network interfaces activity might be calculated.

The currently defined Entity Relationship Rules for the Conceptual Model are shown in Table 5.2-2.

**Table 5.2-2. Entity Relationship Rules (1 of 5)**

Model Substructure	Table	Connected Table	Entity-Relationship Rule
Accounting			
	Account	Account State	An Account exists in one or many Account States.
	Group Account	Authorized Group Account User	A Group Account is authorized to zero, one, or many Authorized Group Account Users.
	Individual Account	Authorized Group Account User	An Individual Account is assigned to an Authorized Group Account User.
	Organization	Group Account	An Organization establishes exactly one Group Account.
Configuration Management			
	Control Item	Control Item	A Control Item is a constituent of at most, one Parent Control Item.
	Control Item	Operational Baseline Version Control Item	A Control Item is approved as zero, one, or many Operational Baseline Version Control Items.

**Table 5.2-2. Entity Relationship Rules (2 of 5)**

Model Substructure	Table	Connected Table	Entity-Relationship Rule
	Document Control Item	Controlled Document Item	A Document Control Item determines procurement authorization for zero, one, or many Controlled Document Items.
	Hardware Control Item	Controlled Hardware Item	A Hardware Control Item determines procurement authorization for zero, one, or many Controlled Hardware Items.
	Operational Baseline	Operational Baseline Version	An Operational Baseline is modified through zero, one, or many Operational Baseline Versions.
	Operational Baseline Version	Operational Baseline Version Control Item	An Operational Baseline Version contains one or many Operational BaselineVersion Control Items.
	Software Control Item	Controlled Software Item	A Software Control Item determines procurement authorization for zero, one, or many Controlled Software Items.
<b>Generic</b>			
	DAAC	Suborder Request	A DAAC executes zero, one, or many Suborder Requests.
	DAAC	DAAC Position	A DAAC is operated by persons holding one or many DAAC Positions.
	DAAC	Order	A DAAC receives zero, one, or many Orders.
	ECS Center	Received Consumable Object	An ECS Center receives zero, one, or many Received Consumable Objects.
	ECS Center	Trouble Ticket	An ECS Center originates zero, one, or many Trouble Tickets.
	ECS Center	Item	An ECS Center has installed one or many Items.
	ECS Employee	Training Course	An ECS Employee attends zero, one, or many Attended Training Courses.
	ECS Employee	Item	An ECS Employee authorizes changes to zero, one, or many Item Modes
	ECS Employee	Operational Baseline	An ECS Employee has approved zero, one, or many Operational Baselines.
	ECS Employee	Item Maintenance	An ECS Employee performs zero, one, or many Item Maintenances.
	ECS Employee	SMC Employee Position	An ECS Employee holds zero, one, or many SMC Employee Positions
	ECS Employee	DAAC Position	An ECS Employee holds zero, one, or many DAAC Employee Positions.
	ECS Employee	EOS Employee Position	An ECS Employee holds zero, one, or many EOS Employee Positions.
	ECS Employee	Certification	An ECS Employee earns zero, one, or many Certifications.
	Location	Organization	A Location is the mailing location of zero, one, or many Organizations.
	Location	Manufacturer Location	A Location locates zero, one, or many Manufacturer Locations.

**Table 5.2-2. Entity Relationship Rules (3 of 5)**

Model Substructure	Table	Connected Table	Entity-Relationship Rule
	Location	Organization	A Location is the Default Billing Location of zero, one, or many Organizations.
	Location	Vendor Location	A Location locates zero, one, or many Vendor Locations.
	Location	Scheduled Training Course	A Location is the location of zero, one, or many Scheduled Training Courses.
	Privilege Group	User Privilege Group	A Privilege Group is assigned as zero, one, or many User Privilege Groups.
	SMC	SMC Position	The SMC is operated by persons holding one or many SMC Positions.
	User	Survey Comment	A User provides zero, one, or many Survey Comments.
	User	Order	A User places zero, one, or many Orders.
	User	User Privilege Group	A User is assigned to one or many User Privilege Groups.
	User	Trouble Ticket	A User opens zero, one, or many Trouble Tickets.
	User	Individual Account	A User is assigned exactly one Individual Account.
	User	Answer	A User provides zero, one, or many Answers.
	User	ECS Employee	A User may be employed as an ECS Employee.
<b>Inventory Management</b>			
	Consumable	Received Consumable Object	A Consumable is received as zero, one, or many Received Consumable Objects.
	Consumable	Item Consumption	A Consumable is consumed as zero, one, or many Item Consumptions.
	Directory	Directory	A Directory is nested in zero, one, or many Parent Directories.
	Directory	Software Item	A Directory contains zero, one, or many Software Items.
	Document Item	Controlled Hardware Item	A Document Item is controlled as zero, one, or many Controlled Hardware Items.
	Hardware Item	Controlled Hardware Item	A Hardware Item is controlled as zero, one, or many Controlled Hardware Items.
	Hardware Item	Directory	A Hardware Item hosts zero, one, or many Directories.
	Item	Confirmed Item Fault	An Item is confirmed as having zero, one, or many Confirmed Item Faults.
	Item	Suspected Faulty Item	An Item is suspected to be zero, one, or many Suspected Faulty Items.
	Item	Item Operational State	An Item operates in zero, one, or many Item Operational States.
	Item	Item Maintenance	An Item is maintained by zero, one, or many Item Maintenances.

**Table 5.2-2. Entity Relationship Rules (4 of 5)**

Model Substructure	Table	Connected Table	Entity-Relationship Rule
	Item	Item Mode	An Item operates in zero, one, or many Item Modes.
	Item	Mode Database	An Item Mode uses zero, one, or many Mode Databases.
	Item	Item	An Item is contained in zero, one, or many Parent Items.
	Item	Maintenance Contract	An Item is maintained in accordance with zero, one, or many Maintenance Contracts.
	Item	Item Consumption	An Item causes zero, one, or many Item Consumptions.
	Manufacturer	Consumable	A Manufacturer makes zero, one, or many Consumables.
	Manufacturer	Manufacturer Point of Contact	A Manufacturer employs zero, one, or many Manufacturer Point-of-Contacts.
	Manufacturer	Manufacturer Location	A Manufacturer is located at zero, one, or many Manufacturer Locations.
	Manufacturer	Maintenance Contract	A Manufacturer sells zero, one, or many Maintenance Contracts.
	Manufacturer	Item	A Manufacturer makes zero, one, or many Items.
	Media	Order Line Item	Media is shipping media for zero, one, or many Order Line Items.
	Software Item	Controlled Software Item	A Software Item is controlled as zero, one, or many Controlled Software Items.
	Vendor	Item	A Vendor sells zero, one, or many items.
	Vendor	Vendor Location	A Vendor is located at zero, one, or many Vendor Locations.
	Vendor	Vendor Point of Contact	A Vendor employs zero, one, or many Vendor Point of Contacts.
<b>Order Processing</b>			
	Order	Order Line Item	An Order contains one or many Order Line Items.
	Order Line Item	Suborder Request	An Order Line Item has data returned by zero, one, or many Suborder Requests.
	Suborder Request	Suborder Request Status Change	A Suborder Request undergoes zero, one, or many Suborder Request Status Changes.
	Suborder Request	Suborder Request	A Suborder Request is partitioned from zero, one, or many Parent Suborder Requests.
<b>Training</b>			
	Curriculum	Certification	A Curriculum is completed for zero, one, or many Certifications.
	Curriculum	Curriculum Course	A Curriculum specifies zero, one, or many Curriculum Courses.
	Curriculum	Required Certification Skill	A Curriculum teaches zero, one, or many Required Certification Skills.

**Table 5.2-2. Entity Relationship Rules (5 of 5)**

<b>Model Substructure</b>	<b>Table</b>	<b>Connected Table</b>	<b>Entity-Relationship Rule</b>
	Scheduled Training Course	Training Course Document	A Scheduled Training Course is taught using zero, one, or many Training Course Documents.
	Scheduled Training Course	Attended Training Course	A Scheduled Training Course is attended as zero, one, or many Attended Training Courses.
	Training Course	Curriculum Course	A Training Course is assigned as zero, one, or many Curriculum Courses.
	Training Course	Scheduled Training Course	A Training Course is scheduled as zero, one, or many Scheduled Training Courses.
	Training Course	Training Course	A Training Course requires zero, one, or many Prerequisite Training Courses.
	Training Document	Training Course Document	A Training Document is used as zero, one, or many Training Course Documents.
<b>Trouble Ticketing/Fault Management</b>			
	Confirmed Item Fault	Corrective Action	A Confirmed Item Fault is corrected by zero, one, or many Corrective Actions.
	Confirmed Item Fault	Recommended Corrective Action Directive	A Confirmed Item Fault is directed by zero, one, or many Recommended Corrective Action Directives.
	Confirmed Item Fault	Recommended Corrective Action	A Confirmed Item Fault has proposed zero, one, or many Recommended Corrective Actions.
	Fault	Confirmed Item Fault	A Fault is confirmed as zero, one, or many Confirmed Item Faults.
	Fault	Suspected Fault	A Fault is suspected as being one or many Suspected Faults.
	Suspected Faulty Item	Suspected Faulty Item	A Suspected Fault is suspected to be caused by zero, one, or many Suspected Faulty Items.
	Trouble Ticket	Suspected Fault	A Trouble Ticket specifies zero, one, or many Suspected Faults.
	Trouble Ticket	Review Board Directive	A Trouble Ticket is directed by zero, one, or many Review Board Directives.
	Trouble Ticket	Trouble Ticket	A Trouble Ticket is partitioned from zero, one, or many Generating Trouble Tickets.
<b>User Comment Survey</b>			
	Category	Survey Comment	A Category is a category of zero, one, or many Survey Comments.
	Category	Category Question	A Category is a category of zero, one, or many Category Questions.
	Question	Answer	A Question is answered by zero, one, or many Answers.
	Question	Category Question	A Question is assigned as zero, one, or many Category Questions.



### 5.2.3 Entity Definitions

Table 5.2-3 contains definitions for all entities identified in the entity diagram in Section 5.2.1. These definitions describe the general class of data that is contained in the entity. All attributes within the entity will relate to the definition of the class of data being defined. The attribute definitions, which include other specifications as well, are found in Section 5.4. The column entitled “Substructure” relates to the diagram substructure (functional area) in Section 5.3. These substructures divide the diagram into logical parts that can be viewed in an easy to read format on a single page. The substructure designation is used to reference the page where the class may be found.

**Table 5.2-3. Entity Definitions (1 of 5)**

Class/Table Name	Substructure	Entity Definition
Account	Accounting	Customer's account for billing and order management.
Account State	Accounting	Provides a historical record of the account status history.
Answer	User Comment Survey	User provided answer to the question posed.
Attended Training Course	Training	The training course the M&O employee has attended.
Authorized Group Account User	Accounting	Links individual USERIDs to the group account.
Category	User Comment Survey	Identifies the category of the comment.
Category Question	User Comment Survey	Relationship record to relate the category of the question to the question.
Certification	Training	The record of an M&O employee certificate.
Confirmed Item Fault	Trouble Ticketing/Fault Management	Classifies a managed item as faulty.
Consumable	Inventory Management	Description of an item that when used must be replaced--generally on a periodic fixed schedule (e.g., paper, toner, ribbon, card-key, diskettes, tape) and maintains a predefined stock volume.
Control Item	Configuration Management	The identification and description of the item that is under baseline configuration management
Corrective Action	Trouble Ticketing/Fault Management	A description of the schedule to correct the fault/problem.
Curriculum	Training	The catalog item that further explains the certification procedure.
Curriculum Course	Training	A course which is offered for an M&O employee.
DAAC	Generic	The Distributed Active Archive Center (DAAC) name.
DAAC Employee Position	Generic	Links employee and position to DAAC

**Table 5.2-3. Entity Definitions (2 of 5)**

<b>Class/Table Name</b>	<b>Substructure</b>	<b>Entity Definition</b>
DAAC Position	Generic	Identifies all budgeted positions required to operate a DAAC.
Directory	Inventory Management	Relates hardware and software items that are configuration managed.
Document Control Item	Configuration Management	Control Items of group type "document".
Document Item	Inventory Management	Describes an item of type "document".
ECS Center	Generic	Generic term for any organization identified to support ECS.
ECS Employee	Generic	Links the ECS Employee to the appropriate ECS Center where the employee works.
Fault	Trouble Ticketing/Fault Management	The class of data that describes the fault and the severity.
Group Account	Accounting	A group account is set up to service multiple individual users. Its purpose is the same as the individual account and also relates it to the authorizing organization.
Hardware Control Item	Configuration Management	Control items of type "hardware".
Hardware Item	Inventory Management	Describes an item of type "hardware".
Individual Account	Accounting	Relates a single user account to the USERID.
Item	Inventory Management	Describes the inventory item that is under configuration management including a consumable item.
Item Consumption	Inventory Management	Information related to item use.
Item Maintenance	Inventory Management	A record of the maintenance performed on a managed item (not related to consumable type item).
Item Mode	Mode Management	Contains information that defines the system and operational mode for the managed item and directs the appropriate software and database usage to accomplish such functions as operational training, maintenance, test, and new development without customer service interruption or performance degradation.
Item Operational State	Inventory Management	A record of the operational status of the item (not related to consumable type item).

**Table 5.2-3. Entity Definitions (3 of 5)**

Class/Table Name	Substructure	Entity Definition
Location	Generic	<p>The <i>Location</i> contains one of several types of address and other pertinent data associated with a USERID.</p> <ul style="list-style-type: none"> <li>- The billing location is the type address where bills (invoices) are sent for products distributed.</li> <li>- The shipping location is the type default address to which an order is shipped/distributed--it is used for the package label if no drop ship address is entered with the order.</li> <li>- The mailing location is the type address associated with the User class and contains the general mailing address for all correspondence and other purposes that are not shipping and billing related. It is dynamic and required for all office mail distributions and notices.</li> </ul>
Maintenance Contract	Inventory Management	Contracts arranged for maintenance of managed items (not related to consumable type item).
Manufacturer	Inventory Management	Manufacturer of a managed item.
Manufacturer Location	Inventory Management	Location of the manufacturer.
Manufacturer Point of Contact	Inventory Management	Contact information for the manufacturer
Media	Inventory Management	A type of consumable item.
Mode Database	Mode Management	The database associated with the mode of operation.
Operational Baseline	Configuration Management	The identification and description of the operational baseline.
Operational Baseline Version	Configuration Management	Identifies the version of the operational baseline.
Operational Baseline Version Control Item	Configuration Management	Links the appropriate control item and the operational baseline version.
Operations Document	Configuration management	A document subtype which describes the document.
Order	Order Processing	<p>The <i>Order</i> contains information about the entire order. It is the class of data that allows the grouping of individual suborders (line items) which describe individual products within the order. Data from the Order class is inherited by each related Suborder class to which it is associated.</p> <p>This class also contains the confirmation information required for orders requested by proxy, i.e., by User Services (Reference the Ops Workshop Minutes January 1996) and the shipping label information for the order. This address may be an ad hoc override or may contain a replication of the default shipping information in the Location entity.</p>

**Table 5.2-3. Entity Definitions (4 of 5)**

Class/Table Name	Substructure	Entity Definition
Order Line Item	Order Processing	The <i>Order Line Item</i> is a class which is synonymous with Suborder. It contains data about a single product within an order. An order may consist of one or many Suborders. At least one Suborder is required for each order.
Organization	Accounting	Describes the organization which accesses or does business with the ECS.
Privilege Group	Generic	This identifies the privileges associated with this user. A user may have multiple privileges.
Question	User Comment Survey	Survey question to be answered by the user.
Received Consumable Object	Inventory Management	Bill of lading. (Used also to support Accounts Payable.)
Recommended Corrective Action	Trouble Ticketing/Fault Management	Identifies that the item must be scheduled for correction. It represents a step in the work flow process.
Recommended Corrective Action Directive	Trouble Ticketing/Fault Management	Identifies the procedure directive.
Required Certification Skill	Training	Identifies the applicable M&O functional skill requirement and relates this to the certification procedure.
Review Board Directive	Trouble Ticketing/Fault Management	Configuration Control Board directive identification and description.
Scheduled Training Course	Training	Describes the available training course according to a predefined schedule.
SMC	Generic	The System Monitoring and Coordination Center (SMC) is a centralized support facility for all DAACs.
SMC Employee Position	Generic	An SMC employee's position held
SMC Position	Generic	A position budgeted for the SMC.
Software Control Item	Configuration Management	Control item of type "software".
Software Item	Inventory Management	A type of managed item.
Suborder Request	Order Processing	This entity relates to the type of user request.
Suborder Request Status Change	Order Processing	A record of the status of a Suborder which is stored as each new event state occurs.
Survey Comment	User Comment Survey	Comment from the user about the survey.
Suspected Fault	Trouble Ticketing/Fault Management	A preliminary determination of the fault/problem.

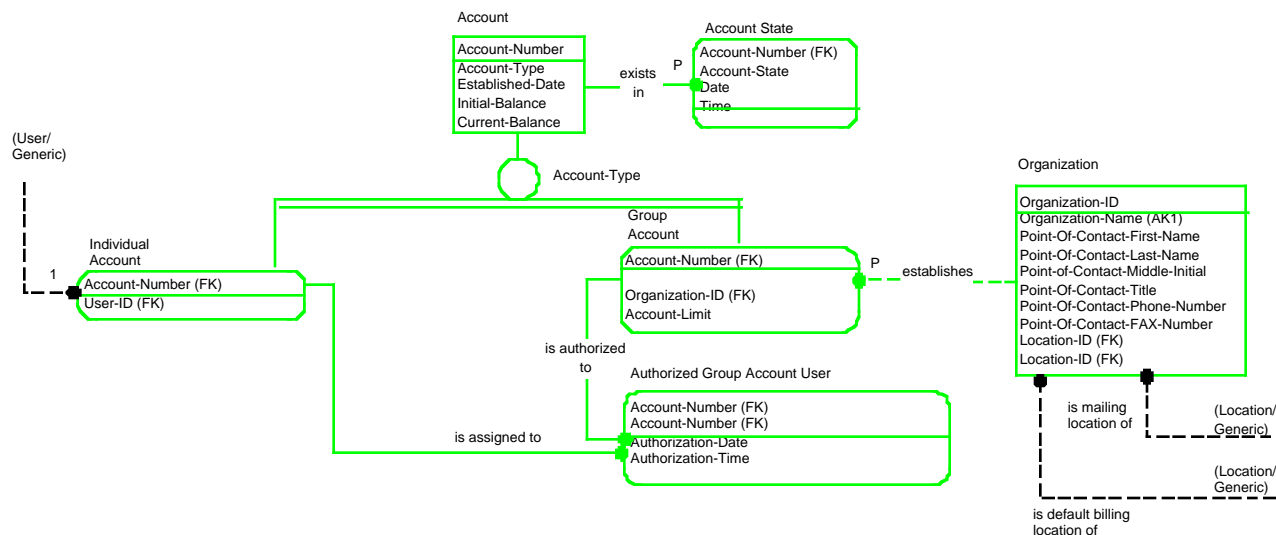
**Table 5.2-3. Entity Definitions (5 of 5)**

<b>Class/Table Name</b>	<b>Substructure</b>	<b>Entity Definition</b>
Suspected Faulty Item	Trouble Ticketing/Fault Management	The inventory item expected to be at fault.
Training Course	Training	Further defines the scheduled training activity such as location, from and to dates, time, instructor, etc.
Training Course Document	Training	This describes the type of document required for the course.
Training Document	Training	This is information relating to the library.
Trouble Ticket	Trouble Ticketing/Fault Management	The trouble report created by the COTS tool.
User	Generic	This class identifies the user and the general information associated with the user to provide the support required to allow the ECS services to function.
User Privilege Group	Generic	The privilege group to which the user may be assigned. The group contains multiple privileges for access to services and data.
Vendor	Inventory Management	Managed item purchasing source.
Vendor Location	Inventory Management	Address of the Vendor.
Vendor Point of Contact	Inventory Management	Contact information for the Vendor.

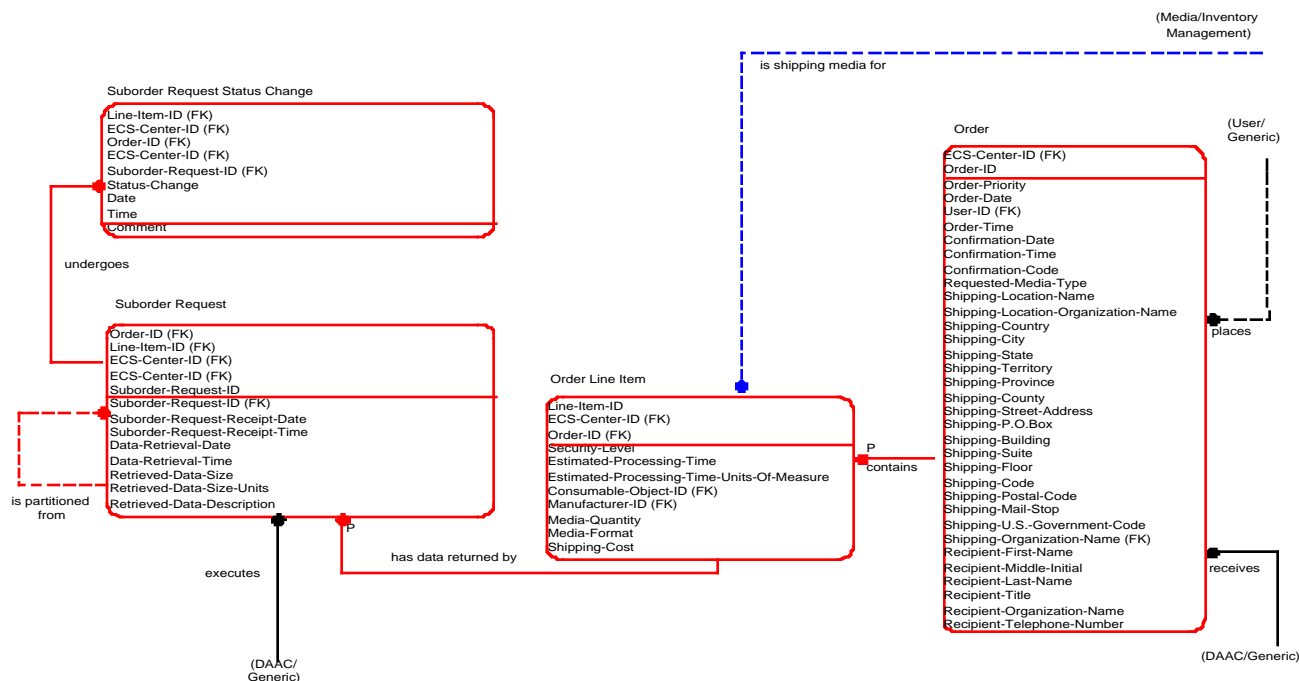
### **5.3 Detailed Entity Relationship Diagrams by Functional Area**

Representations of this type are referred to as "Conceptual Models" of data in the ANSI/X3/SPARC Three-Schema Architecture terminology. Although the Conceptual Model constitutes a single system of sentences, the model has been broken into substructures as shown in Figures 5.3-1 through 5.3-12 in order to fit conveniently onto 8.5" by 11" page. Each substructure illustrates all of the "defining" relational dependencies that exist for at least one entity. This diagramming convention makes it possible in single illustrations to show, for each entity in the Conceptual Model, all of the parent entities from which foreign key attributes have been inherited. Attributes are the lowest level of addressable data that can be described. They are normalized and related to the entity. How, and in what magnitude, the entities are "related" to one another are carried forward from the functional area ERD in Section 5.2.1. In combination, these entities, attributes, the relationships between the entities, and the specifications of the entities and attributes comprise the CSMS conceptual data model. This conceptual model is software and platform independent and is wholly independent of any physical storage configurations and any data access methods. The diagrams are designed to be useful to database designers and implementers and subsystem developers. It is also a practical

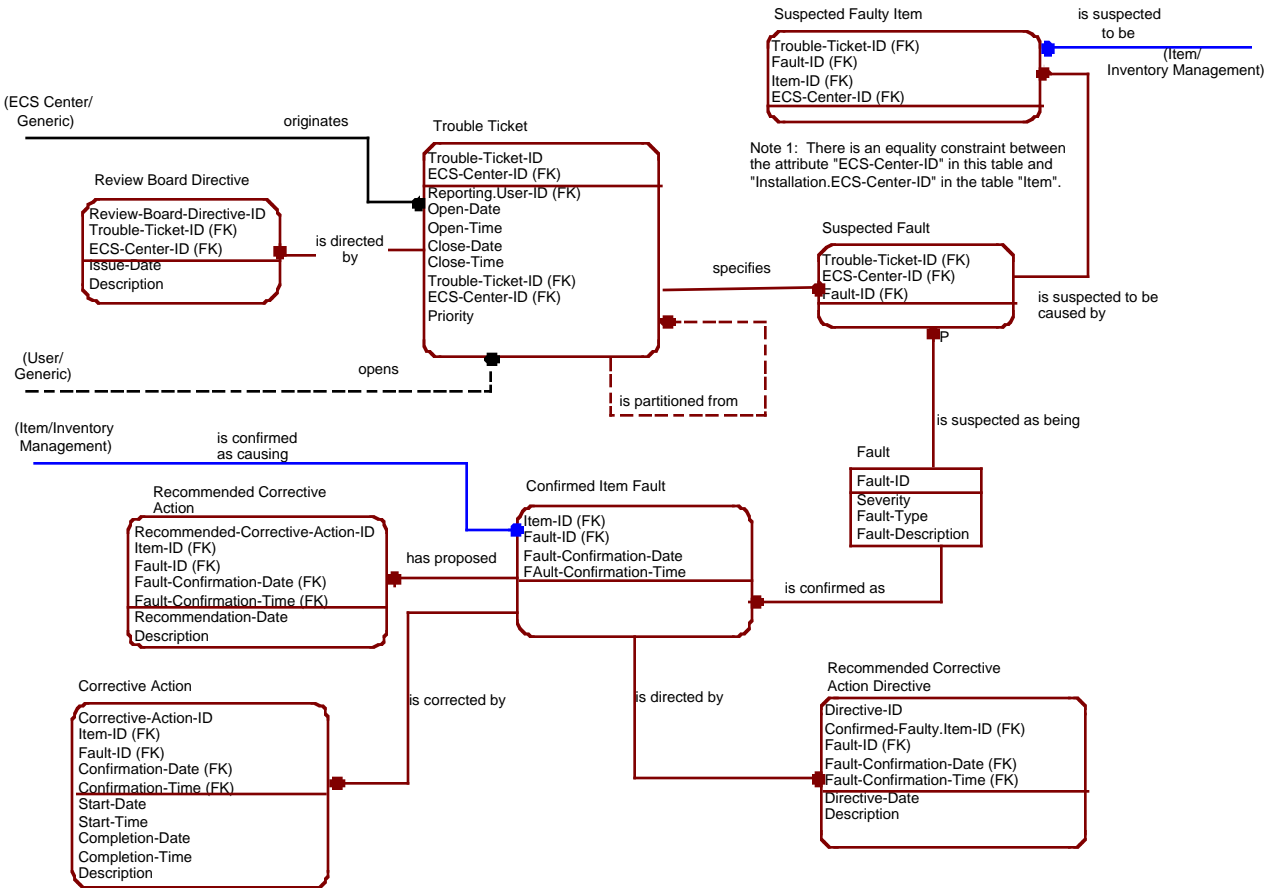
means to identify to interested users the CSMS data supporting the ECS infrastructure. Reference Section 4.4 to determine how to read the methodology syntax.



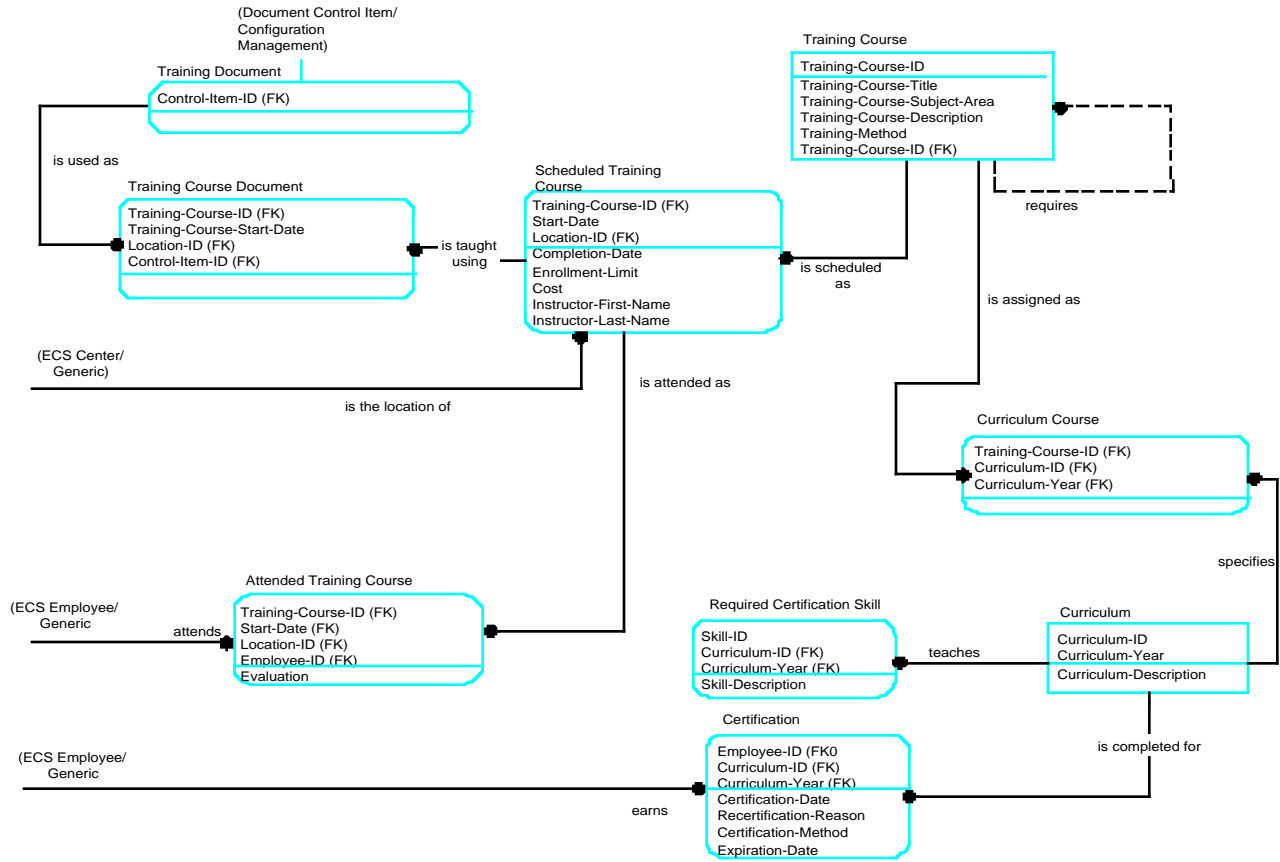
**Figure 5.3-1. Accounting Substructure**



**Figure 5.3-2. Order Processing Substructure**

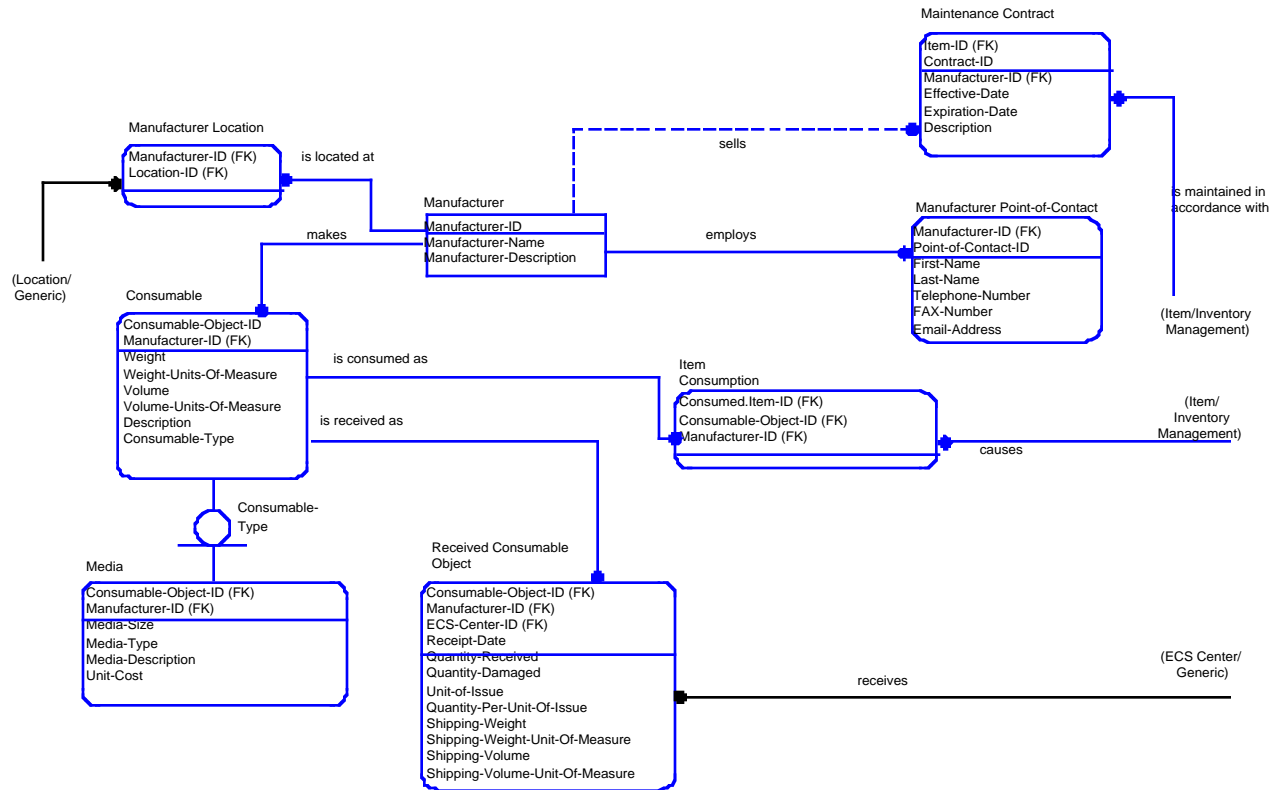


**Figure 5.3-3. Trouble Ticketing/Fault Management Substructure**

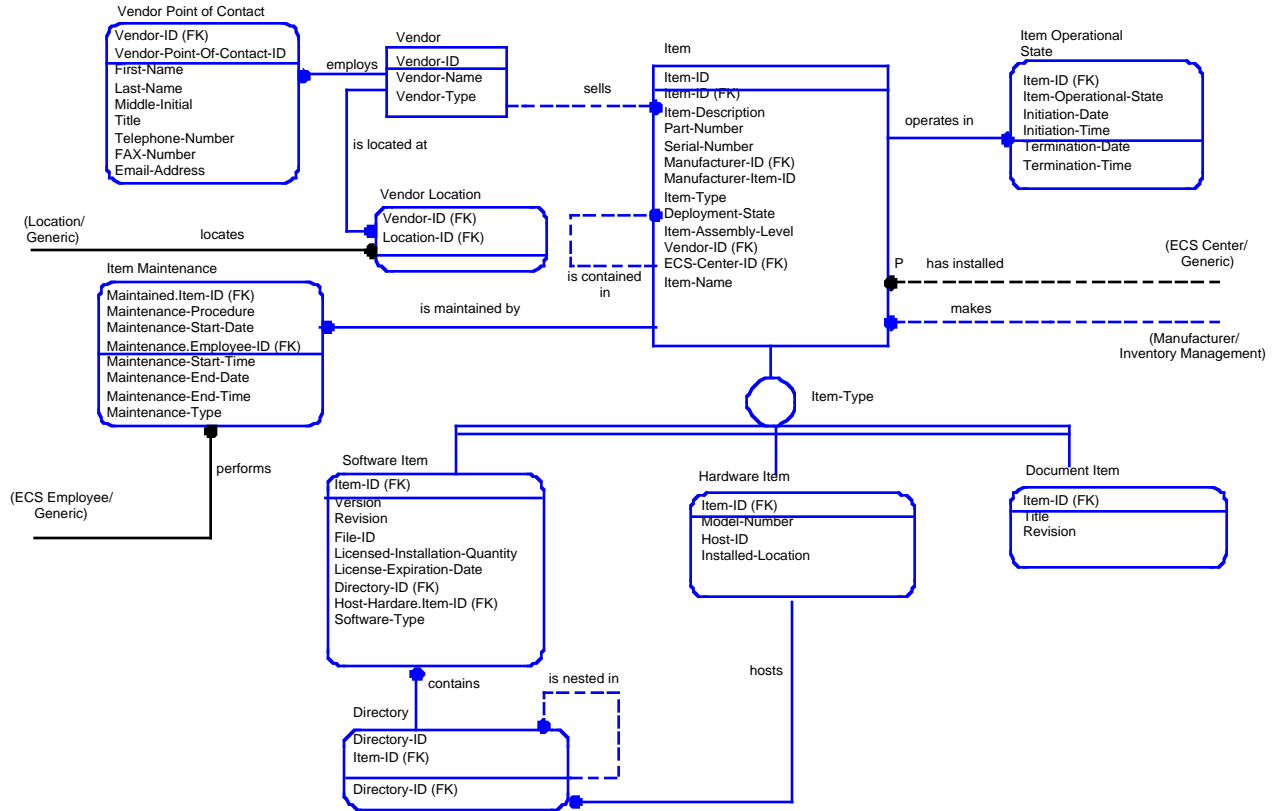


**Figure 5.3-4. Training Substructure**

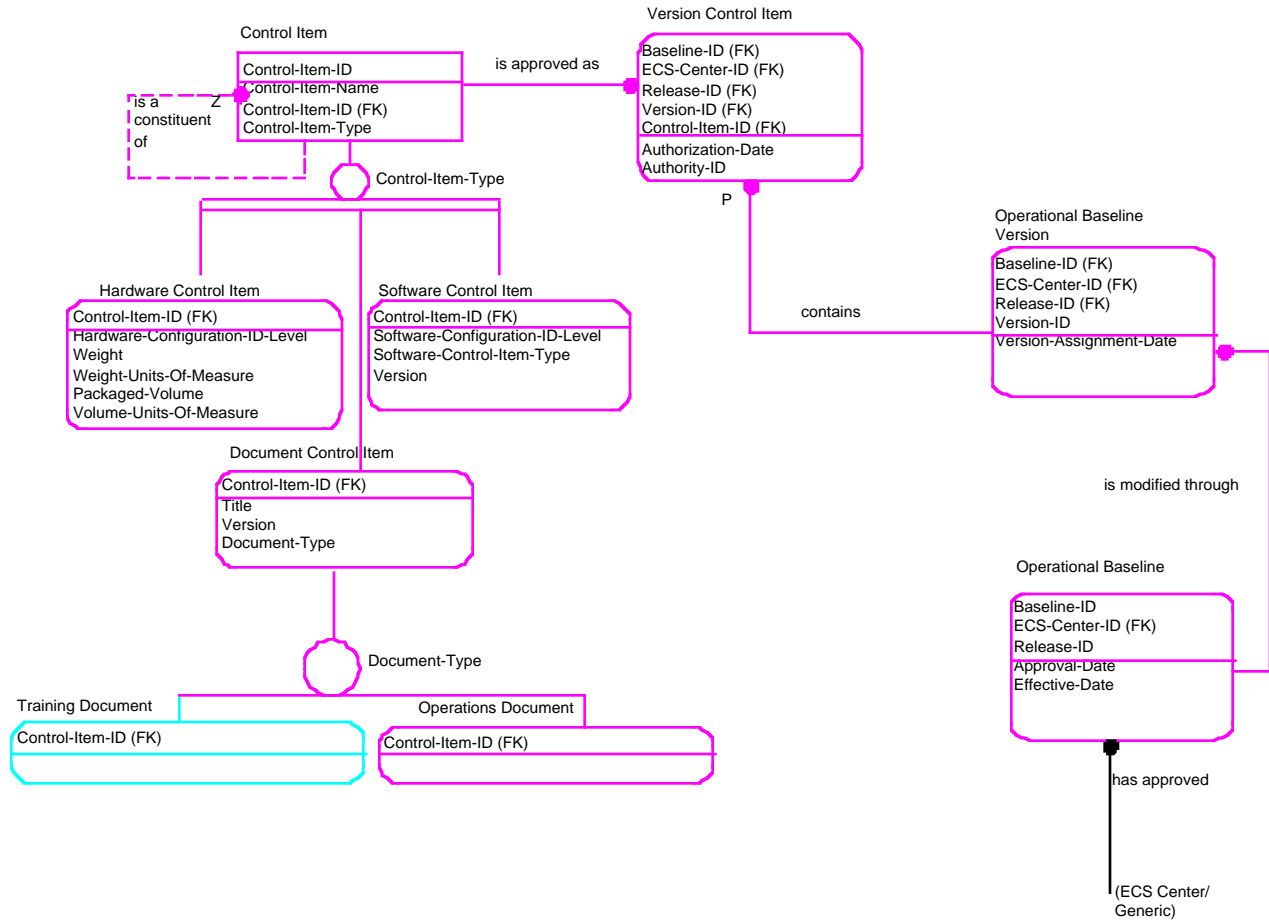




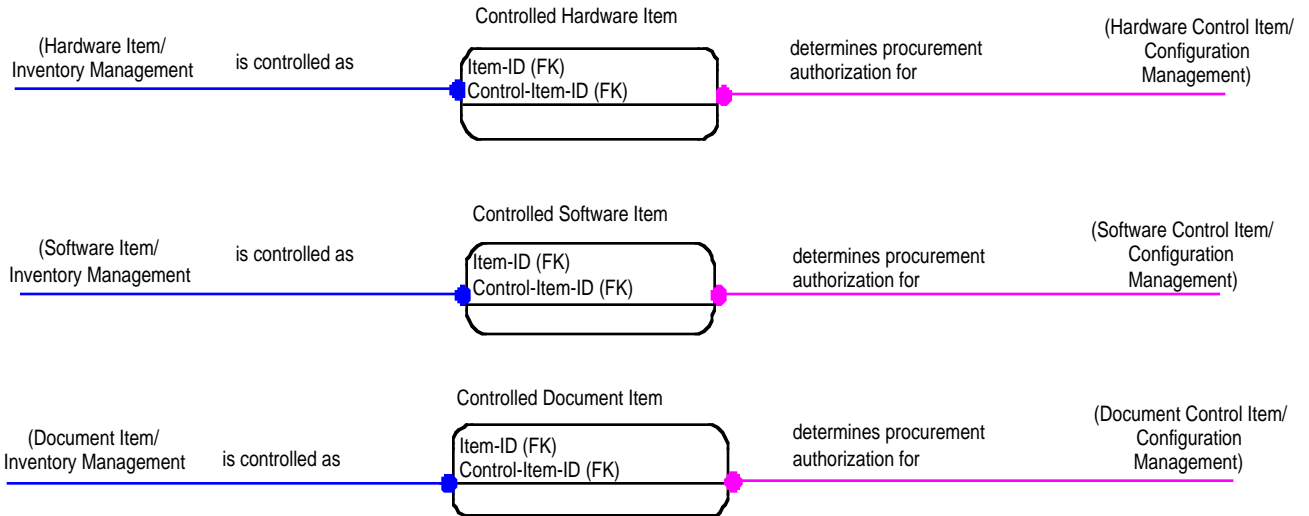
**Figure 5.3-5. Inventory Management Substructure (1 of 2)**



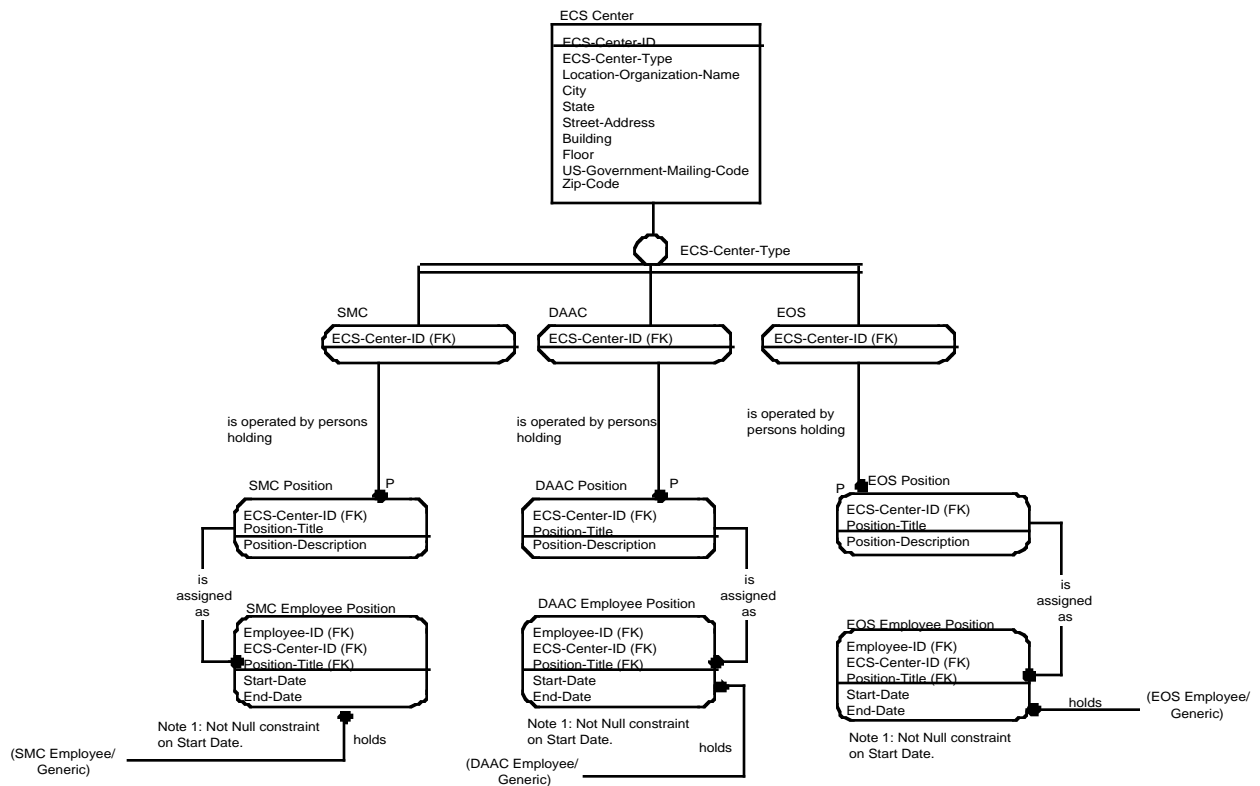
**Figure 5.3-6. Inventory Management Substructure (2 of 2)**



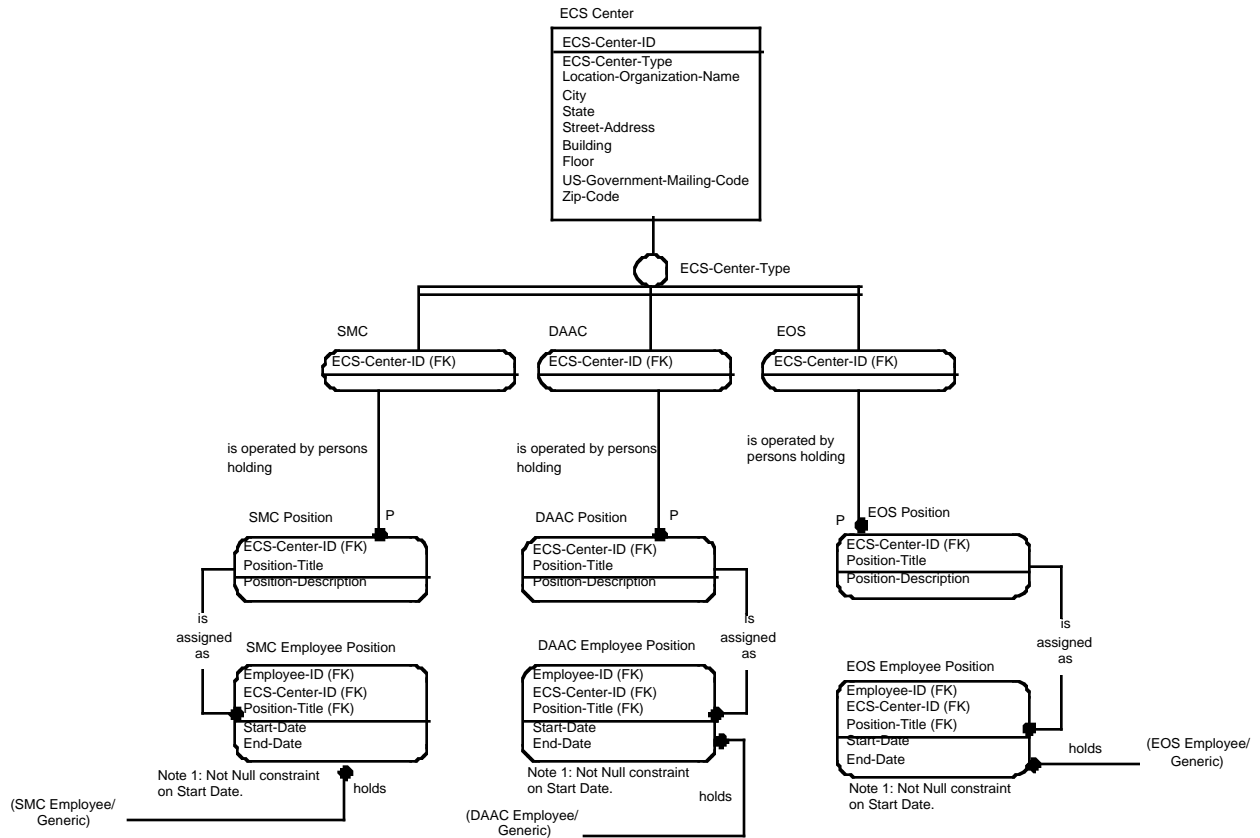
**Figure 5.3-7. Configuration Management Substructure**



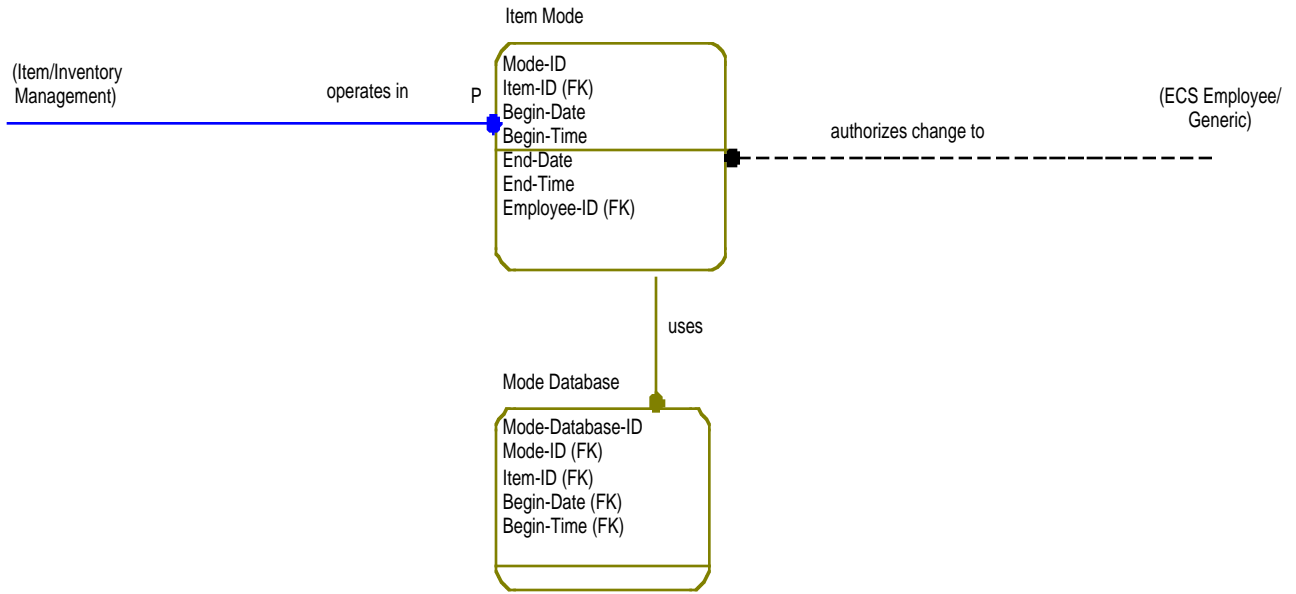
**Figure 5.3-8. Generic Substructure (1 of 3)**



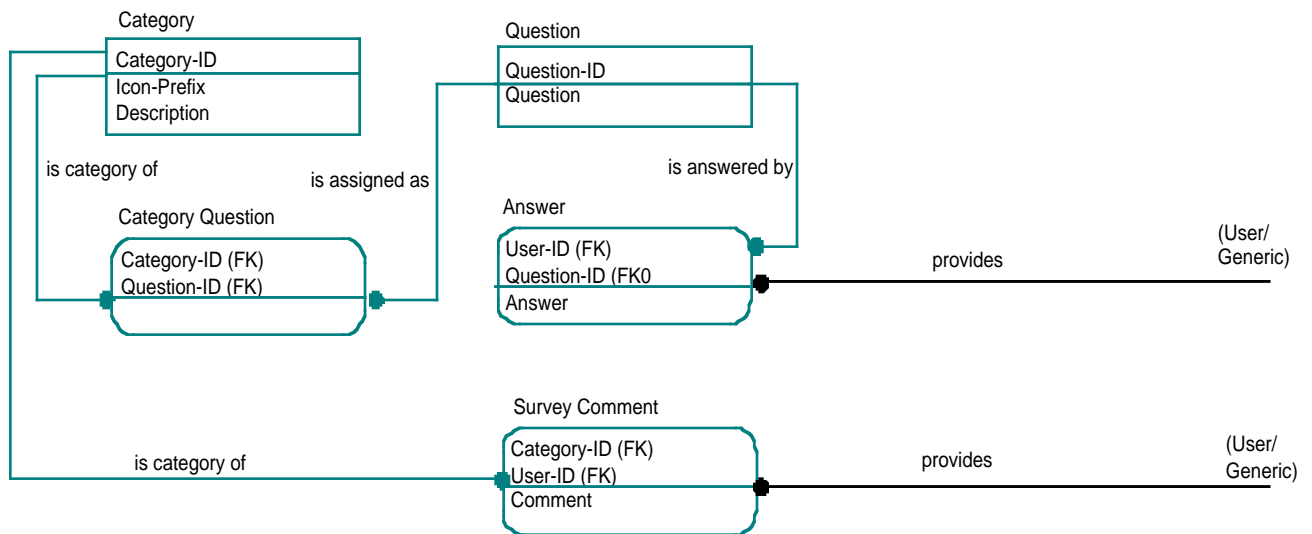
**Figure 5.3-9. Generic Substructure (2 of 3)**



**Figure 5.3-10. Generic Substructure (3 of 3)**



**Figure 5.3-11. Mode Management Substructure**



**Figure 5.3-12. User Comment Survey Substructure**

## **5.4 Data Attribute Specifications (Data Dictionary)**

The CSMS Data Specifications (formerly identified as the CSMS Data Dictionary) is a catalog of attributes identified as being part of the model including specific references for mapping back to the Detailed ERDs in Section 5.3. The Data Attribute Specifications shown in Table 5.4-1 are organized alphabetically by attribute name to facilitate look up of a particular attribute. Additional specifications that may be found in the internal model in Section 6 are not replicated here. The model substructure, table name and attribute name may be used to reference this additional information in Section 6.

**Table 5.4-1. CSMS Data Specifications Sorted by Attribute**

Attribute Name	Table Name	Model Substructure	Attribute Description	Domain
Account-Limit	Group Account	Accounting	The set of dollar limits placed on group accounts	The set of real numbers $\geq 0$ , rounded to two significant figures
Account-Number	Account	Accounting	The set of SMC assigned accounts, both individual and group	The set of integers $> 0$
Account-Number	Account State	Accounting	The set of accounts assigned to both individuals and organizations	The set of integers $> 0$
Account-Number	Authorized Group Account User	Accounting	The set of accounts assigned to individuals	The set of integers $> 0$
Account-Number	Authorized Group Account User	Accounting	The set of accounts assigned to organizations	The set of integers $> 0$
Account-Number	Group Account	Accounting	The set of group accounts	The set of integers $> 0$
Account-Number	Individual Account	Accounting	The set of individual accounts	The set of integers $> 0$
Account-State	Account State	Accounting	The set of account states {Open, Closed, Inactive, On hold, ..}	The set of account states {Open, Closed, Inactive, On hold, ..}
Account-Type	Account	Accounting	The set of account types which are {individual, group}	The set {Individual, Group}
Answer	Answer	User Comment Survey	The set of answers to questions on surveys	The set of answers
Approval-Date	Operational Baseline	Configuration Management	The set of dates on which the CCB has approved new baselines	The set of dates
Authority-ID	Operational Baseline Version Control Item	Configuration Management	The set of authorities who sanction the association of a control item to an operational baseline version	The set of authority designators for the assignment of a control item to an operational baseline version
Authorization-Date	Authorized Group Account User	Accounting	The set of dates on which users are authorized to charge to a customer account	The set of dates
Authorization-Date	Operational Baseline Version Control Item	Configuration Management	The set of authorization dates for the assignment of a control item to an operational baseline version	The set of authorization date designators for the assignment of a control item to an operational baseline version
Authorization-Time	Authorized Group Account User	Accounting	The set of times on which users are authorized to charge to a customer	The set of times on a 24 hour clock



**Table 5.4-1. CSMS Data Specifications Sorted by Attribute**

Attribute Name	Table Name	Model Substructure	Attribute Description	Domain
			account	
Baseline-ID	Operational Baseline	Configuration Management	The set of configuration baselines	The set of configuration baseline identifiers
Baseline-ID	Operational Baseline Version	Configuration Management	The set of operational baselines	The set of operational baseline designators
Baseline-ID	Operational Baseline Version Control Item	Configuration Management	The set of operational baselines	The set of operational baseline designators
Begin-Date	Item Mode	Mode Management	The set of mode start dates	The set of Mode start date designations
Begin-Date	Mode Database	Mode Management	The set of mode begin dates	The set of mode begin date designators
Begin-Time	Item Mode	Mode Management	The set of mode start times	The set of Mode start time designations
Begin-Time	Mode Database	Mode Management	The set of mode begin times	The set of mode begin time designators
Building	ECS Center	Generic	The set of Building Identifiers for ECS Centers	{ }
Building	Location	Generic	The set of building addresses	The set of building addresses
Category-ID	Category	User Comment Survey	The set of category designators	The set of category designators
Category-ID	Category Question	User Comment Survey	The set of categories of survey questions and comments	The set of category designators
Category-ID	Survey Comment	User Comment Survey	The set of categories of survey questions and comments	The set of category designators
Certification-Date	Certification	Training	The set of dates on which certifications are issued	The set of dates
Certification-Method	Certification	Training	The set of certification methods	The set of certification method designators
City	ECS Center	Generic	The set of cities in which ECS Centers are located	{Fairbanks, Sioux Falls, Greenbelt, Pasadena, Hampton, Huntsville, Boulder, Oak Ridge,

**Table 5.4-1. CSMS Data Specifications Sorted by Attribute**

Attribute Name	Table Name	Model Substructure	Attribute Description	Domain
				University Center}
City	Location	Generic	The set of world city designators	The set of world city designators
Close-Date	Trouble Ticket	Trouble Ticketing/Fault Management	The set of trouble ticket close dates	The set of dates
Close-Time	Trouble Ticket	Trouble Ticketing/Fault Management	The set of trouble ticket close times	The set of times on a 24 hour clock
Code	Location	Generic	The set of US internal mail codes	The set of US internal mail codes
Comment	Suborder Request Status Change	Order Processing	The set of line item status change comments	The set of line item status change comments
Comment	Survey Comment	User Comment Survey	The set of survey comments from users	The set of survey comments
Completion-Date	Corrective Action	Trouble Ticketing/Fault Management	The set of completion dates for corrective actions	The set of dates after 1/1/97
Completion-Date	Scheduled Training Course	Training	The set of Scheduled Training Course Completion Dates	The set of dates
Completion-Time	Corrective Action	Trouble Ticketing/Fault Management	The set of completion times for corrective actions	The set of times on a 24 hour clock
Confirmation-Code	Order	Order Processing	The set of confirmation codes	The set of integers > 0
Confirmation-Date	Order	Order Processing	The set of order confirmation dates	The set of Confirmation Date designators
Confirmation-Date	Recommended Corrective Action	Trouble Ticketing/Fault Management	The set of dates on which faults are confirmed	The set of dates
Confirmation-Time	Order	Order Processing	The set of order confirmation times	The set of Order Confirmation Time designators
Confirmation-Time	Recommended Corrective Action	Trouble Ticketing/Fault Management	The set of times on which faults are confirmed	The set of times
Confirmed-Fault-ID	Recommended Corrective Action	Trouble Ticketing/Fault Management	The set of confirmed faults on a trouble ticket for which a corrective action is recommended	The set of integers > 0

**Table 5.4-1. CSMS Data Specifications Sorted by Attribute**

Attribute Name	Table Name	Model Substructure	Attribute Description	Domain
Consumable-Object-ID	Consumable	Inventory Management	The set of consumable objects	The set of consumable object designators, manufacturer determined
Consumable-Object-ID	Item Consumption	Inventory Management	The set of consumed consumable objects	The set of consumable object designations that are consumed
Consumable-Object-ID	Order Line Item	Order Processing	The set of consumable objects that are media	The set of Vendor assigned identifiers of data storage media
Consumable-Object-ID	Received Consumable Object	Inventory Management	The set of received consumable objects	The set of consumable objects
Consumable-Type	Consumable	Inventory Management	The set of consumable types, (e.g. media, printer cartridges, printer paper, copying paper, etc.)	The set of consumable types (e.g. Media, Printer Cartridges, Printer Paper, Copying Paper, etc.)
Contract-ID	Maintenance Contract	Inventory Management	The set of maintenance contracts	The set of maintenance contract identifiers
Control-Item-ID	Control Item	Configuration Management	The set of control items that have at least one constituent control item	The set of integers > 0
Control-Item-ID	Control Item	Configuration Management	The set of control item identifiers, where a control item denotes a class of objects under configuration control (e.g. Sun Sparc 10 workstation, Sybase version 10, etc.)	The set of integers > 0
Control-Item-ID	Document Control Item	Configuration Management	The set of control items that are documents	The set of integers > 0
Control-Item-ID	Hardware Control Item	Configuration Management	The set of Hardware Control Items	The set of integers > 0
Control-Item-ID	Operational Baseline Version Control Item	Configuration Management	The set of control items	The set of Control Item designators
Control-Item-ID	Operations Document	Configuration Management	The set of Document Control Items that are Operations Document Control Items	The set of integers > 0

**Table 5.4-1. CSMS Data Specifications Sorted by Attribute**

Attribute Name	Table Name	Model Substructure	Attribute Description	Domain
Control-Item-ID	Software Control Item	Configuration Management	The set of software control items	The set of integers > 0
Control-Item-ID	Training Course Document	Training	The set of Document Control Items that are Training Document Control Items used in the instruction of a training course	The set of integers > 0
Control-Item-ID	Training Document	Training	The set of Document Control Items that are Training Document Control Items	The set of integers > 0
Control-Item-Name	Control Item	Configuration Management	The set of names of control items, (Sun Sparc 10 workstation, Sybase version 10, etc.)	The set of control item names
Control-Item-Type	Control Item	Configuration Management	The set control item categories denoted by "Hardware Control Item" or "Document Control Item" or "Software Control Item"	The set of values {Hardware Control Item, Document Control Item, Software Control Item}
Corrective-Action-ID	Corrective Action	Trouble Ticketing/Fault Management	The set of corrective actions	The set of integers > 0
Cost	Scheduled Training Course	Training	The set of costs of Scheduled Training Courses	The set of real numbers rounded to two decimal places
Country	Location	Generic	The set of countries	The set of country designators
County	Location	Generic	The set of U.S. counties or foreign country counties	The set of U.S. counties or foreign country county designators
Creation-Date	User Privilege Group	Generic	The set of user privilege group assignment dates	The set of dates
Creation-Time	User Privilege Group	Generic	The set of user privilege assignment times	The set of times on a 24 hour clock
Current Balance	Account	Accounting	The set of dollars and cents currency that is the current account balance, which may be a negative number that is greater than the negative number that represents the credit limit	The set of two digit real numbers > the credit limit
Curriculum-Description	Curriculum	Training	The set of curricula descriptions	The set of curricula

**Table 5.4-1. CSMS Data Specifications Sorted by Attribute**

Attribute Name	Table Name	Model Substructure	Attribute Description	Domain
				descriptions
Curriculum-ID	Certification	Training	The set of course curricula	The set of curricula identifiers
Curriculum-ID	Curriculum	Training	The set of training course curricula	The set of curricula identifiers
Curriculum-ID	Curriculum Course	Training	The set of training course curricula	The set of curricula identifiers
Curriculum-ID	Required Certification Skill	Training	The set of curricula	The set of curricula identifiers
Curriculum-Training-Course	Curriculum Course	Training	The set of training courses that are included in at least one curriculum	The set of integers > 0
Curriculum-Year	Certification	Training	The set of years in which a curriculum is available or effective	The set of years
Curriculum-Year	Curriculum	Training	The set of years in which curricula are available or effective	The set of integers > 1996
Curriculum-Year	Curriculum Course	Training	The set of years in which curricula are available or effective	The set of integers > 1996
Curriculum-Year	Required Certification Skill	Training	The set of years in which a curriculum is available or effective	The set of years
Data-Retrieval-Date	Suborder Request	Order Processing	The set of product retrieval dates	The set of product retrieval date designators
Data-Retrieval-Time	Suborder Request	Order Processing	The set of product retrieval times	The set of product retrieval time designators
Database-ID	Mode Database	Mode Management	The set of mode databases	The set of mode database designators
Date	Account State	Accounting	The set of dates on which accounts change to their current state	The set of dates
Date	Suborder Request Status Change	Order Processing	The set of dates on which an order line item status change occurs	The set of dates
Deployment-State	Item	Inventory Management	The set of deployment states	The set of Deployment state

**Table 5.4-1. CSMS Data Specifications Sorted by Attribute**

Attribute Name	Table Name	Model Substructure	Attribute Description	Domain
				designations
Description	Category	User Comment Survey	The set of category descriptions	The set of category descriptions
Description	Consumable	Inventory Management	The set of consumable item descriptions	The set of consumable item descriptions
Description	Corrective Action	Trouble Ticketing/Fault Management	The set of corrective action descriptions	The set of corrective action descriptions
Description	Maintenance Contract	Inventory Management	The set of maintenance contract descriptions	The set of maintenance contract descriptions
Description	Privilege Group	Generic	The set of privilege group descriptions	The set of privilege group descriptions
Description	Recommended Corrective Action	Trouble Ticketing/Fault Management	The set of description of the recommended corrective actions	The set of corrective actions
Description	Recommended Corrective Action Directive	Trouble Ticketing/Fault Management	The set of descriptions or texts of review board directives	The set of review board directives
Description	Review Board Directive	Trouble Ticketing/Fault Management	The set of Review Board directives	The set of Review Board Directives
Directive-Date	Recommended Corrective Action Directive	Trouble Ticketing/Fault Management	The set of corrective action directive dates	The set of dates
Directive-ID	Recommended Corrective Action Directive	Trouble Ticketing/Fault Management	The set of recommended corrective action directives	The set of integers > 0
Directory	Software Item	Inventory Management	The set of directories	The set of directory designators
Directory-ID	Directory	Inventory Management	The set of directories on system components for which there are constituent directories	The set of directories on system components
Directory-ID	Directory	Inventory Management	The set of directories on ECS systems	The set of directories on system components
Document-Title	Document Item	Inventory Management	The set of documents	The set of titles for ECS owned documents
Document-Type	Document Control Item	Configuration Management	The set of control item document types, {Training, Operations, Maintenance Document, User's Guide,	The set {Training Document, Operations Document, Maintenance Document, User's

**Table 5.4-1. CSMS Data Specifications Sorted by Attribute**

Attribute Name	Table Name	Model Substructure	Attribute Description	Domain
			Operations Document, ...}	Guide, ...}
ECS-Center-ID	DAAC	Generic	{Alaska SAR Facility DAAC, EROS Data Center DAAC, Goddard Space Flight Center DAAC, JPL Physical Oceanographic DAAC, Langley Research Center DAAC, Marshall Space Flight Center DAAC, Oak Ridge National Laboratory DAAC, Socio-economic Data and Applications Center DAAC}	{Alaska SAR Facility DAAC, EROS Data Center DAAC, Goddard Space Flight Center DAAC, JPL Physical Oceanographic DAAC, Langley Research Center DAAC, Marshall Space Flight Center DAAC, Oak Ridge National Laboratory DAAC, Socio-economic Data and Applications Center DAAC}
ECS-Center-ID	DAAC Employee Position	Generic	{Alaska SAR Facility DAAC, EROS Data Center DAAC, Goddard Space Flight Center DAAC, JPL Physical Oceanographic DAAC, Langley Research Center DAAC, Marshall Space Flight Center DAAC, Oak Ridge National Laboratory DAAC, Socio-economic Data and Applications Center DAAC}	{Alaska SAR Facility DAAC, EROS Data Center DAAC, Goddard Space Flight Center DAAC, JPL Physical Oceanographic DAAC, Langley Research Center DAAC, Marshall Space Flight Center DAAC, Oak Ridge National Laboratory DAAC, Socio-economic Data and Applications Center DAAC}
ECS-Center-ID	DAAC Position	Generic	{Alaska SAR Facility DAAC, EROS Data Center DAAC, Goddard Space Flight Center DAAC, JPL Physical Oceanographic DAAC, Langley Research Center DAAC, Marshall Space Flight Center DAAC, Oak Ridge National Laboratory DAAC, Socio-economic Data and Applications Center DAAC}	{Alaska SAR Facility DAAC, EROS Data Center DAAC, Goddard Space Flight Center DAAC, JPL Physical Oceanographic DAAC, Langley Research Center DAAC, Marshall Space Flight Center DAAC, Oak Ridge National Laboratory DAAC, Socio-economic Data and Applications Center DAAC}
ECS-Center-ID	ECS Center	Generic	{Alaska SAR Facility DAAC, EROS Data Center DAAC, Goddard Space Flight Center DAAC, Goddard Space Flight Center SMC, Goddard Space Flight Center EOC, JPL Physical Oceanographic DAAC, Langley Research Center DAAC, Marshall Space Flight Center DAAC, Oak Ridge National Laboratory DAAC, Socio-economic Data and Applications Center DAAC}	{Alaska SAR Facility DAAC, EROS Data Center DAAC, Goddard Space Flight Center DAAC, Goddard Space Flight Center SMC, Goddard Space Flight Center EOC, JPL Physical Oceanographic DAAC, Langley Research Center DAAC, Marshall Space Flight Center DAAC, Oak Ridge National Laboratory DAAC,

**Table 5.4-1. CSMS Data Specifications Sorted by Attribute**

Attribute Name	Table Name	Model Substructure	Attribute Description	Domain
				Socio-economic Data and Applications Center DAAC}
ECS-Center-ID	Item	Inventory Management	{Alaska SAR Facility DAAC, EROS Data Center DAAC, Goddard Space Flight Center DAAC, Goddard Space Flight Center SMC, Goddard Space Flight Center EOC, JPL Physical Oceanographic DAAC, Langley Research Center DAAC, Marshall Space Flight Center DAAC, Oak Ridge National Laboratory DAAC, Socio-economic Data and Applications Center DAAC}	{Alaska SAR Facility DAAC, EROS Data Center DAAC, Goddard Space Flight Center DAAC, Goddard Space Flight Center SMC, Goddard Space Flight Center EOC, JPL Physical Oceanographic DAAC, Langley Research Center DAAC, Marshall Space Flight Center DAAC, Oak Ridge National Laboratory DAAC, Socio-economic Data and Applications Center DAAC}
ECS-Center-ID	Operational Baseline	Configuration Management	{Alaska SAR Facility DAAC, EROS Data Center DAAC, Goddard Space Flight Center DAAC, Goddard Space Flight Center SMC, Goddard Space Flight Center EOC, JPL Physical Oceanographic DAAC, Langley Research Center DAAC, Marshall Space Flight Center DAAC, Oak Ridge National Laboratory DAAC, Socio-economic Data and Applications Center DAAC}	{Alaska SAR Facility DAAC, EROS Data Center DAAC, Goddard Space Flight Center DAAC, Goddard Space Flight Center SMC, Goddard Space Flight Center EOC, JPL Physical Oceanographic DAAC, Langley Research Center DAAC, Marshall Space Flight Center DAAC, Oak Ridge National Laboratory DAAC, Socio-economic Data and Applications Center DAAC}
ECS-Center-ID	Operational Baseline Version	Configuration Management	{Alaska SAR Facility DAAC, EROS Data Center DAAC, Goddard Space Flight Center DAAC, Goddard Space Flight Center SMC, Goddard Space Flight Center EOC, JPL Physical Oceanographic DAAC, Langley Research Center DAAC, Marshall Space Flight Center DAAC, Oak Ridge National Laboratory DAAC, Socio-economic Data and Applications Center DAAC}	{Alaska SAR Facility DAAC, EROS Data Center DAAC, Goddard Space Flight Center DAAC, Goddard Space Flight Center SMC, Goddard Space Flight Center EOC, JPL Physical Oceanographic DAAC, Langley Research Center DAAC, Marshall Space Flight Center DAAC, Oak Ridge National Laboratory DAAC, Socio-economic Data and Applications Center DAAC}
ECS-Center-ID	Operational Baseline Version Control Item	Configuration Management	{Alaska SAR Facility DAAC, EROS Data Center DAAC, Goddard Space Flight Center DAAC, Goddard Space Flight Center SMC, Goddard Space Flight Center EOC, JPL Physical Oceanographic DAAC, Langley	{Alaska SAR Facility DAAC, EROS Data Center DAAC, Goddard Space Flight Center DAAC, Goddard Space Flight Center SMC, Goddard Space Flight Center EOC, JPL



**Table 5.4-1. CSMS Data Specifications Sorted by Attribute**

Attribute Name	Table Name	Model Substructure	Attribute Description	Domain
			Research Center DAAC, Marshall Space Flight Center DAAC, Oak Ridge National Laboratory DAAC, Socio-economic Data and Applications Center DAAC}	Physical Oceanographic DAAC, Langley Research Center DAAC, Marshall Space Flight Center DAAC, Oak Ridge National Laboratory DAAC, Socio-economic Data and Applications Center DAAC}
ECS-Center-ID	Order	Order Processing	{Alaska SAR Facility DAAC, EROS Data Center DAAC, Goddard Space Flight Center DAAC, JPL Physical Oceanographic DAAC, Langley Research Center DAAC, Marshall Space Flight Center DAAC, Oak Ridge National Laboratory DAAC, Socio-economic Data and Applications Center DAAC}	{Alaska SAR Facility DAAC, EROS Data Center DAAC, Goddard Space Flight Center DAAC, JPL Physical Oceanographic DAAC, Langley Research Center DAAC, Marshall Space Flight Center DAAC, Oak Ridge National Laboratory DAAC, Socio-economic Data and Applications Center DAAC}
ECS-Center-ID	Order Line Item	Order Processing	{Alaska SAR Facility DAAC, EROS Data Center DAAC, Goddard Space Flight Center DAAC, JPL Physical Oceanographic DAAC, Langley Research Center DAAC, Marshall Space Flight Center DAAC, Oak Ridge National Laboratory DAAC, Socio-economic Data and Applications Center DAAC}	{Alaska SAR Facility DAAC, EROS Data Center DAAC, Goddard Space Flight Center DAAC, JPL Physical Oceanographic DAAC, Langley Research Center DAAC, Marshall Space Flight Center DAAC, Oak Ridge National Laboratory DAAC, Socio-economic Data and Applications Center DAAC}
ECS-Center-ID	Received Consumable Object	Inventory Management	The set of ECS Centers that receive consumable objects	{Alaska SAR Facility DAAC, EROS Data Center DAAC, Goddard Space Flight Center DAAC, Goddard Space Flight Center SMC, Goddard Space Flight Center EOC, JPL Physical Oceanographic DAAC, Langley Research Center DAAC, Marshall Space Flight Center DAAC, Oak Ridge National Laboratory DAAC, Socio-economic Data and Applications Center DAAC}
ECS-Center-ID	Review Board Directive	Trouble Ticketing/Fault Management	The set of ECS Centers where trouble tickets are opened	{Alaska SAR Facility DAAC, EROS Data Center DAAC, Goddard Space Flight Center

**Table 5.4-1. CSMS Data Specifications Sorted by Attribute**

Attribute Name	Table Name	Model Substructure	Attribute Description	Domain
				DAAC, Goddard Space Flight Center SMC, Goddard Space Flight Center EOC, JPL Physical Oceanographic DAAC, Langley Research Center DAAC, Marshall Space Flight Center DAAC, Oak Ridge National Laboratory DAAC, Socio-economic Data and Applications Center DAAC}
ECS-Center-ID	SMC	Generic	{Goddard Space Flight Center SMC}	{Goddard Space Flight Center SMC}
ECS-Center-ID	SMC Employee Position	Generic	{Goddard Space Flight Center SMC}	{Goddard Space Flight Center SMC}
ECS-Center-ID	SMC Position	Generic	The set of ECS centers that are SMC's (only one member)	{Goddard Space Flight Center SMC}
ECS-Center-ID	Suborder Request	Order Processing	{Alaska SAR Facility DAAC, EROS Data Center DAAC, Goddard Space Flight Center DAAC, JPL Physical Oceanographic DAAC, Langley Research Center DAAC, Marshall Space Flight Center DAAC, Oak Ridge National Laboratory DAAC, Socio-economic Data and Applications Center DAAC}	{Alaska SAR Facility DAAC, EROS Data Center DAAC, Goddard Space Flight Center DAAC, JPL Physical Oceanographic DAAC, Langley Research Center DAAC, Marshall Space Flight Center DAAC, Oak Ridge National Laboratory DAAC, Socio-economic Data and Applications Center DAAC}
ECS-Center-ID	Suborder Request	Order Processing	The set of DAACs	{Alaska SAR Facility DAAC, EROS Data Center DAAC, Goddard Space Flight Center DAAC, JPL Physical Oceanographic DAAC, Langley Research Center DAAC, Marshall Space Flight Center DAAC, Oak Ridge National Laboratory DAAC, Socio-economic Data and Applications Center DAAC}
ECS-Center-ID	Suborder Request Status Change	Order Processing	The set of DAACs where orders are initially received	{Alaska SAR Facility DAAC, EROS Data Center DAAC, Goddard Space Flight Center DAAC, JPL Physical Oceanographic DAAC, Langley

**Table 5.4-1. CSMS Data Specifications Sorted by Attribute**

Attribute Name	Table Name	Model Substructure	Attribute Description	Domain
				Research Center DAAC, Marshall Space Flight Center DAAC, Oak Ridge National Laboratory DAAC, Socio-economic Data and Applications Center DAAC}
ECS-Center-ID	Suborder Request Status Change	Order Processing	{Alaska SAR Facility DAAC, EROS Data Center DAAC, Goddard Space Flight Center DAAC, JPL Physical Oceanographic DAAC, Langley Research Center DAAC, Marshall Space Flight Center DAAC, Oak Ridge National Laboratory DAAC, Socio-economic Data and Applications Center DAAC}	{Alaska SAR Facility DAAC, EROS Data Center DAAC, Goddard Space Flight Center DAAC, JPL Physical Oceanographic DAAC, Langley Research Center DAAC, Marshall Space Flight Center DAAC, Oak Ridge National Laboratory DAAC, Socio-economic Data and Applications Center DAAC}
ECS-Center-ID	Suspected Fault	Trouble Ticketing/Fault Management	The set of ECS Centers where trouble tickets are opened that identify a suspected fault	{Alaska SAR Facility DAAC, EROS Data Center DAAC, Goddard Space Flight Center DAAC, Goddard Space Flight Center SMC, Goddard Space Flight Center EOC, JPL Physical Oceanographic DAAC, Langley Research Center DAAC, Marshall Space Flight Center DAAC, Oak Ridge National Laboratory DAAC, Socio-economic Data and Applications Center DAAC}
ECS-Center-ID	Suspected Faulty Item	Trouble Ticketing/Fault Management	The set of ECS Centers where trouble tickets are opened that identify a suspected fault	{Alaska SAR Facility DAAC, EROS Data Center DAAC, Goddard Space Flight Center DAAC, Goddard Space Flight Center SMC, Goddard Space Flight Center EOC, JPL Physical Oceanographic DAAC, Langley Research Center DAAC, Marshall Space Flight Center DAAC, Oak Ridge National Laboratory DAAC, Socio-economic Data and Applications Center DAAC}
ECS-Center-ID	Trouble Ticket	Trouble Ticketing/Fault Management	The set of ECS Centers that open a trouble ticket in response to a trouble ticket received from another ECS-Center	{Alaska SAR Facility DAAC, EROS Data Center DAAC, Goddard Space Flight Center DAAC, Goddard Space Flight

**Table 5.4-1. CSMS Data Specifications Sorted by Attribute**

Attribute Name	Table Name	Model Substructure	Attribute Description	Domain
				Center SMC, Goddard Space Flight Center EOC, JPL Physical Oceanographic DAAC, Langley Research Center DAAC, Marshall Space Flight Center DAAC, Oak Ridge National Laboratory DAAC, Socio-economic Data and Applications Center DAAC}
ECS-Center-ID	Trouble Ticket	Trouble Ticketing/Fault Management	The set of ECS Centers where trouble tickets are opened	{Alaska SAR Facility DAAC, EROS Data Center DAAC, Goddard Space Flight Center DAAC, Goddard Space Flight Center SMC, Goddard Space Flight Center EOC, JPL Physical Oceanographic DAAC, Langley Research Center DAAC, Marshall Space Flight Center DAAC, Oak Ridge National Laboratory DAAC, Socio-economic Data and Applications Center DAAC}
ECS-Center-Type	ECS Center	Generic	The set of ECS center types by functional denotation	{SMC, EOC, DAAC}
Effective-Date	Maintenance Contract	Inventory Management	The set of effective dates of maintenance contracts for items	The set of dates
Effective-Date	Operational Baseline	Configuration Management	The set of dates on which baselines becomes effective	The set of dates
Email-Address	User	Generic	The set of electronic mail addresses	The set of electronic mail addresses
Email-Address	Vendor Point of Contact	Inventory Management	The set of vendor point of contact e-mail addresses	The set of electronic mail addresses
Employee-First-Name	ECS Employee	Generic	The set of persons first names	The set of persons first names
Employee-ID	Attended Training Course	Training	The set of ECS employees who attend training courses	The set of integers > 0
Employee-ID	Certification	Training	The set of ECS employees who have received a certification	The set of integers > 0
Employee-ID	DAAC Employee Position	Generic	The set of employees holding a	The set of integers > 0

**Table 5.4-1. CSMS Data Specifications Sorted by Attribute**

Attribute Name	Table Name	Model Substructure	Attribute Description	Domain
			particular position at a DAAC	
Employee-ID	ECS Employee	Generic	The set of ECS employees	The set of integers > 0
Employee-ID	Item Maintenance	Inventory Management	The set of ECS employees who perform maintenance tasks	The set of integers > 0
Employee-ID	Item Mode	Mode Management	The set of ECS Employees who authorize changes in modes of system operation	The set of integers > 0
Employee-ID	SMC Employee Position	Generic	The set of SMC employees	The set of identifiers of SMC employees
Employee-Last-Name	ECS Employee	Generic	The set of employee last names	The set of employee last names
End Time	Item Mode	Mode Management	The set of mode end times	The set of Mode end time designations
End-Date	DAAC Employee Position	Generic	The set of dates on which an DAAC employees discontinue working in a DAAC employee position	The set of Dates > 1996
End-Date	Item Mode	Mode Management	The set of mode end dates	The set of Mode end date designations
End-Date	SMC Employee Position	Generic	The set of SMC employee position end dates	The set of SMC Employee Position end dates
Enrollment-Limit	Scheduled Training Course	Training	The set of training course enrollment limits	The set of integers > 0
Established-Date	Account	Accounting	The set of dates on which accounts are established by registered users	The set of dates later than 1/1/97
Estimated-Processing-Time	Order Line Item	Order Processing	The set of estimated processing times	The set of real numbers
Estimated-Processing-Time-U	Order Line Item	Order Processing	The set of time units of measure	The set of processing time nits-of-Measure unit of measure designators
Evaluation	Attended Training Course	Training	The set of Training Course Evaluations	The set of Training Course Evaluations
Expiration-Date	Certification	Training	The set of dates on which employees' certifications expire	The set of Dates later than 1/1/97

**Table 5.4-1. CSMS Data Specifications Sorted by Attribute**

Attribute Name	Table Name	Model Substructure	Attribute Description	Domain
Expiration-Date	Maintenance Contract	Inventory Management	The set of end dates of maintenance contracts	The set of dates
Fault-Confirmation-Date	Confirmed Item Fault	Trouble Ticketing/Fault Management	The set of dates on which faults are confirmed	The set of dates
Fault-Confirmation-Date	Corrective Action	Trouble Ticketing/Fault Management	The set of dates on which faults in items are confirmed	The set of dates after 1/1/97
Fault-Confirmation-Date	Recommended Corrective Action Directive	Trouble Ticketing/Fault Management	The set of item fault confirmation dates	The set of dates
Fault-Confirmation-Time	Confirmed Item Fault	Trouble Ticketing/Fault Management	The set of times on which faults are confirmed	The set of times on a 24 hour clock
Fault-Confirmation-Time	Corrective Action	Trouble Ticketing/Fault Management	The set of times in which faults in items are confirmed	The set of times on a 24 hour clock
Fault-Confirmation-Time	Recommended Corrective Action Directive	Trouble Ticketing/Fault Management	The set of times on which faults are confirmed	The set of times on a 24 hour clock
Fault-Description	Fault	Trouble Ticketing/Fault Management	The set of fault descriptions	The set of fault descriptions
Fault-ID	Confirmed Item Fault	Trouble Ticketing/Fault Management	The set of confirmed faults	The set of integers > 0
Fault-ID	Corrective Action	Trouble Ticketing/Fault Management	The set of confirmed faults	The set of integers > 0
Fault-ID	Fault	Trouble Ticketing/Fault Management	The set of faults that are suspected or confirmed to occur at an ECS Site	The set of integers > 0
Fault-ID	Recommended Corrective Action Directive	Trouble Ticketing/Fault Management	The set of confirmed item faults for which there is a recommended corrective action directive	The set of confirmed item faults
Fault-ID	Suspected Faulty Item	Trouble Ticketing/Fault Management	The set of suspected faults	The set of integers > 0
Fault-Type	Fault	Trouble Ticketing/Fault Management	The set of fault types	The set of designations for fault types
FAX-Number	User	Generic	The set of user FAX numbers	The set of FAX numbers, both national and international

**Table 5.4-1. CSMS Data Specifications Sorted by Attribute**

<b>Attribute Name</b>	<b>Table Name</b>	<b>Model Substructure</b>	<b>Attribute Description</b>	<b>Domain</b>
FAX-Number	Vendor Point of Contact	Inventory Management	The set of vendor FAX numbers	The set of international telephone numbers
File-ID	Software Item	Inventory Management	The set of files in which a software items are stored in an ECS system	The set of file names used in the ECS system
First-Name	User	Generic	The set of user first names	The set of User first names
First-Name	Vendor Point of Contact	Inventory Management	The set of vendor point of contact first names	The set of first names
Floor	ECS Center	Generic	The set of Floor Identifiers for ECS Centers	The set of floor designators at ECS Centers
Floor	Location	Generic	The set of floors	The set of floor disignators
Host-ID	Directory	Inventory Management	The set of hardware items that host system software	The set of integers > 0
Host-ID	Hardware Item	Inventory Management	The set of host identifiers	The set of host identifiers
Icon-Prefix	Category	User Comment Survey	The set of icon prefixes	The set of icon prefixes
Initial-Balance	Account	Accounting	The set of dollars and cents currency provided by a registered user to establish an initial account balance	The set of non-negative two decimal place real numbers
Initiation-Date	Item Operational State	Inventory Management	The set of item operational state initiation dates	The set of item state initiation date designators
Initiation-Time	Item Operational State	Inventory Management	The set of item operational state initiation times	The set of item state initiation time designators
Installed-Location	Hardware Item	Inventory Management	The set of hardware locations	The set of hardware installation location designators
Instructor-First-Name	Scheduled Training Course	Training	The set of Instructor first names	The set of Instructor First Names
Instructor-Last-Name	Scheduled Training Course	Training	The set of Instructor last names	The set of Instructor Last Names
Issue-Date	Review Board Directive	Trouble Ticketing/Fault Management	The set of dates on which Review Board Directives are issued	The set of dates

**Table 5.4-1. CSMS Data Specifications Sorted by Attribute**

Attribute Name	Table Name	Model Substructure	Attribute Description	Domain
Item-Assembly-Level	Item	Inventory Management	The set of item assembly levels (e.g. system, subsystem, workstation, etc.)	The set of item assembly level designators
Item-Description	Item	Inventory Management	The set of descriptions of items	The set of descriptions of items
Item-ID	Confirmed Item Fault	Trouble Ticketing/Fault Management	The set of items in which a fault has been confirmed	The set of integers > 0
Item-ID	Corrective Action	Trouble Ticketing/Fault Management	The set of items that have confirmed faults	The set of integers > 0
Item-ID	Document Item	Inventory Management	The set of documents	The set of integers > 0
Item-ID	Hardware Item	Inventory Management	The set of hardware items	The set of integers > 0
Item-ID	Item	Inventory Management	The set of items, which include items which are systems of items, items that are assemblies of items, and items that are regarded as discrete entities	The set of integers > 0
Item-ID	Item	Inventory Management	The set of ECS owned items	The set of integers > 0
Item-ID	Item Consumption	Inventory Management	The set of consumed items	The set of integers > 0
Item-ID	Item Maintenance	Inventory Management	The set of maintained items	The set of integers > 0
Item-ID	Item Mode	Mode Management	The set of items	The set of integers > 0
Item-ID	Item Operational State	Inventory Management	The set of items	The set of integers > 0
Item-ID	Maintenance Contract	Inventory Management	The set of Items maintained under a maintenance contract	The set of integers > 0
Item-ID	Mode Database	Mode Management	The set of items that change mode	The set of integers > 0
Item-ID	Recommended Corrective Action	Trouble Ticketing/Fault Management	The set of items on which faults have been confirmed	The set of integers > 0
Item-ID	Recommended Corrective Action Directive	Trouble Ticketing/Fault Management	The set of items in which a fault has been confirmed	The set of integers > 0
Item-ID	Software Item	Inventory Management	The set of software item components of ECS, either purchased or custome developed, from the highest	The set of integers > 0



**Table 5.4-1. CSMS Data Specifications Sorted by Attribute**

Attribute Name	Table Name	Model Substructure	Attribute Description	Domain
			level assembly to the lowest level component that has been distinctly identified.	
Item-ID	Software Item	Inventory Management	The set of hardware items that host directories	The set of integers > 0
Item-ID	Suspected Faulty Item	Trouble Ticketing/Fault Management	The set of suspected faulty items	The set of integers > 0
Item-Name	Item	Inventory Management	The set of items, which include items which are systems of items, items that are assemblies of items, and items that are regarded as discrete entities	The set of names of items
Item-Operational-State	Item Operational State	Inventory Management	{Off-line, Off-line for repair, Off-line for maintenance, Off-line for upgrade, On-line, On-line for test, On-line for training, On-line for simulation}	{Off-line, Off-line for repair, Off-line for maintenance, Off-line for upgrade, On-line, On-line for test, On-line for training, On-line for simulation}
Item-Type	Item	Inventory Management	The set of item types {Software Item, Hardware Item, Document Item}	The set of item types {Software Item, Hardware Item, Document Item}
Last-Name	User	Generic	The set of user last names	The set of User last names
Last-Name	Vendor Point of Contact	Inventory Management	The set of vendor point of contact last names	The set of last names
License-Expiration-Date	Software Item	Inventory Management	The set of license expiration dates	The set of dates
Licensed-Installation-Quantity	Software Item	Inventory Management	The set of licensed installation quantities of COTS software	The set of integers > 0
Line-Item-ID	Order Line Item	Order Processing	The set of order line items	The set of integers > 0
Line-Item-ID	Suborder Request	Order Processing	The set of Receiving DAAC order line items	The set of integers > 0
Line-Item-ID	Suborder Request Status Change	Order Processing	The set of order line items	The set of integers > 0
Location-ID	Attended Training Course	Training	The set of AttendedTraining Course Locations	The set of integers > 0

**Table 5.4-1. CSMS Data Specifications Sorted by Attribute**

Attribute Name	Table Name	Model Substructure	Attribute Description	Domain
Location-ID	Location	Generic	The set of locations used for mailing, billing, and shipping purposes	The set of system assigned location identifiers, an integer > 0
Location-ID	Manufacturer Location	Inventory Management	The set of manufacturer's mailing locations	The set of system assigned location identifiers, an integer > 0
Location-ID	Organization	Accounting	The set of organization default billing locations	The set of integers > 0
Location-ID	Organization	Accounting	The set of mailing locations for organizations with accounts	The set of integers > 0
Location-ID	Scheduled Training Course	Training	The set of training course locations	The set of integers > 0
Location-ID	Training Course Document	Training	The set of training course locations	The set of integers > 0
Location-ID	User	Generic	The set of billing locations designated by users	The set of integers > 0
Location-ID	User	Generic	The set of mailing locations	The set of integers > 0
Location-ID	User	Generic	The set of shipping locations	The set of integers > 0
Location-ID	Vendor Location	Inventory Management	The set of vendor locations	The set of system assigned location identifiers, an integer > 0
Location-Name	Location	Generic	The set of location names (e.g. Rockefeller Center)	The set of location names
Location-Organization-Name	ECS Center	Generic	The set of Location Organization Names for ECS Centers	{ CERES, University of Colorado, Environmental Services Division }
Location-Organization-Name	Location	Generic	The set of location organization names (e.g. U.S. Treasury)	The set of location organization names
Mail-Stop	Location	Generic	The set of mail stops	The set of mail stop designators
Maintenance-End-Date	Item Maintenance	Inventory Management	The set of maintenance end dates	The set of emaintenance end date designations

**Table 5.4-1. CSMS Data Specifications Sorted by Attribute**

Attribute Name	Table Name	Model Substructure	Attribute Description	Domain
Maintenance-End-Time	Item Maintenance	Inventory Management	The set of times at which maintenance ends on items	The set of times on a 24 hour clock
Maintenance-Procedure	Item Maintenance	Inventory Management	The set of maintenance procedures	The set of maintenance procedure designators
Maintenance-Start-Date	Item Maintenance	Inventory Management	The set of maintenance start dates	The set of maintenance dates
Maintenance-Start-Time	Item Maintenance	Inventory Management	The set of maintenance start times	The set of times on a 24 hour clock
Maintenance-Type	Item Maintenance	Inventory Management	The set of maintenance types	The set of maintenance types
Manufacturer-Description	Manufacturer	Inventory Management	The set of manufacturer descriptions	The set of manufacturer descriptions
Manufacturer-ID	Consumable	Inventory Management	The set of consumable objects	The set of integers > 0
Manufacturer-ID	Item	Inventory Management	The set of item manufacturers	The set of positive integers
Manufacturer-ID	Item Consumption	Inventory Management	The set of manufacturers of consumed consumable objects	The set of integers > 0
Manufacturer-ID	Maintenance Contract	Inventory Management	The set of manufacturers who contract to maintain items	The set of integers > 0
Manufacturer-ID	Manufacturer	Inventory Management	The set of manufacturers	The set of integers > 0
Manufacturer-ID	Manufacturer Location	Inventory Management	The set of manufacturers	The set of integers > 0
Manufacturer-ID	Manufacturer Point of Contact	Inventory Management	The set of manufacturers that have points of contact	The set of integers > 0
Manufacturer-ID	Media	Inventory Management	The set of manufacturers of consumable media	The set of integers > 0
Manufacturer-ID	Order Line Item	Order Processing	The set of manufacturers of consumable media	The set of integers > 0
Manufacturer-ID	Received Consumable Object	Inventory Management	The set of manufactures of received consumable objects	The set of integers > 0
Manufacturer-Item-ID	Item	Inventory Management	The set of Manufacturer assigned item names	The set of Manufacturer assigned item names
Manufacturer-Name	Manufacturer	Inventory Management	The set of manufacturers	The set of manufacturer

**Table 5.4-1. CSMS Data Specifications Sorted by Attribute**

Attribute Name	Table Name	Model Substructure	Attribute Description	Domain
				names
Media-Consumable-Object-ID	Media	Inventory Management	The set of consumable objects that are media	The set of Vendor assigned identifiers of data storage media
Media-Description	Media	Inventory Management	The set of media descriptions	The set of media descriptions
Media-Format	Order Line Item	Order Processing	The set of media formats	The set of Media Format designators (PC, MACINTOSH, ISO 9660, UNLABELED, ...)
Media-Quantity	Order Line Item	Order Processing	The set of integers that denote the number of units of media needed to ship the product for a given line item	The set of integers > 0
Media-Size	Media	Inventory Management	The set of media sizes	The set of media sizes {5.25", 8.5", ..}
Media-Type	Media	Inventory Management	The set of media types {9mm magnetic tape, optical disk, floppy disk, ...}	The set of media types {9mm magnetic tape, optical disk, floppy disk, ...}
Middle-Initial	ECS Employee	Generic	The set of ECS Employee Middle Initials	The set of alphabetic characters
Middle-Initial	User	Generic	The set of user middle initials	The set of User middle initials
Middle-Initial	Vendor Point of Contact	Inventory Management	The set of user middle initials	The set of user middle initials
Mode-ID	Item Mode	Mode Management	The set of modes	The set of mode designators
Mode-ID	Mode Database	Mode Management	The set of modes	The set of mode designators
Model-Number	Hardware Item	Inventory Management	The set of manufacturer assigned model numbers	The set of manufacturer assigned model numbers designations
Open-Date	Trouble Ticket	Trouble Ticketing/Fault Management	The set of dates on which a trouble ticket is opened	The set of dates
Open-Time	Trouble Ticket	Trouble Ticketing/Fault Management	The set of times at which a trouble ticket is opened	The set of times on a 24 hour clock

**Table 5.4-1. CSMS Data Specifications Sorted by Attribute**

Attribute Name	Table Name	Model Substructure	Attribute Description	Domain	
Order-Date	Order	Order Processing	The set of order dates	The set of order date designators	
Order-ID	Order	Order Processing	The set of orders	The set of integers > 0	
Order-ID	Order Line Item	Order Processing	The set of orders	The set of integers > 0	
Order-ID	Suborder Request	Order Processing	The set of Receiving DAAC orders	The set of integers > 0	
Order-ID	Suborder Request Status Change	Order Processing	The set of orders	The set of integers > 0	
Order-Priority	Order	Order Processing	The set of order priorities	The set of integers > 0 and < 257	
Order-Time	Order	Order Processing	The set of order times	The set of order time designators	
Organization	User	Generic	The set of organization to which users of ECS belong	The set of user organization designations	
Organization-ID	Group Account	Accounting	The set of organizations that establish group accounts	The set of integers > 0	
Organization-ID	Organization	Accounting	The set of organizations with whom ECS conducts business	The set of integers > 0	
Organization-Name	Organization	Accounting	The name given by an organization that establishes a charge account	The set of organization names	
P.O. Box	Location	Generic	The set of Post Office Boxes	The set of Post Office Boxes	
Packaged-Volume	Hardware Control Item	Configuration Management	The set of hardware control item volumes when packaged	The set of real numbers > 0	
Part-Number	Item	Inventory Management	The set of manufacturer part numbers for ECS owned items	The set of manufacturer assigned part numbers for ECS owned items	
Password	User	Generic	The set of user selected passwords	The set of user selected passwords	
Phone-Number	User	Generic	The set of user's telephone numbers	The set of national or international phone numbers, including country code	
Point-Of-Contact-Email-Address	Manufacturer Point of	Inventory Management	The set of manufacturer point of Contact	The set of manufacturer contact Email addresses	point of contact Email

**Table 5.4-1. CSMS Data Specifications Sorted by Attribute**

Attribute Name	Table Name	Model Substructure	Attribute Description	Domain
				addresses
Point-Of-Contact-FAX-Number	Manufacturer Point of Contact	Inventory Management	The set of FAX numbers of manufacturer points of contact	The set of international telephone numbers
Point-Of-Contact-FAX-Number	Organization	Accounting	The set of international phone numbers for FAX machines at organizations with accounts	The set of integers > 0
Point-Of-Contact-First-Name	Manufacturer Point of Contact	Inventory Management	The set of manufacturer point of contact first names	The set of manufacturer point of contact first names
Point-Of-Contact-First-Name	Organization	Accounting	The set of organization point of contact first names	The set of person's first names
Point-Of-Contact-ID	Manufacturer Point of Contact	Inventory Management	The set of manufacturer points of contact	The set of Point of Contact Identifiers
Point-Of-Contact-ID	Vendor Point of Contact	Inventory Management	The set of vendor points of contact	The set of integers > 0
Point-Of-Contact-Last-Name	Manufacturer Point of Contact	Inventory Management	The set of manufacturer point of contact last names	The set of manufacturer point of contact last names
Point-Of-Contact-Last-Name	Organization	Accounting	The set of organization point of contact last names	The set of person's last names
Point-of-Contact-Middle-Initial	Organization	Accounting	The set of organization point of	The set of alphabetic contact middle initials characters
Point-Of-Contact-Phone-	Organization	Accounting	The set of international phone Number numbers for organizations with accounts	The set of integers > 0
Point-Of-Contact-Title	Organization	Accounting	The set of organization point of contact titles	The set of position titles
Position-Description	DAAC Position	Generic	The set of DAAC position Descriptions	The set of DAAC position Descriptions
Position-Description	SMC Position	Generic	The set of SMC Position Descriptions	The set of SMC position Descriptions
Position-Title	DAAC Employee Position	Generic	The set of DAAC position titles	The set of DAAC position titles
Position-Title	DAAC Position	Generic	The set of titles assigned to DAAC employees	The set of titles assigned to DAAC employees

**Table 5.4-1. CSMS Data Specifications Sorted by Attribute**

Attribute Name	Table Name	Model Substructure	Attribute Description	Domain
Position-Title	SMC Employee Position	Generic	The set of SMC positions	The set of SMC position titles
Position-Title	SMC Position	Generic	The set of position titles assigned to employees at the SMC	The set of position titles assigned to employees at the SMC
Postal-Code	Location	Generic	The set of U.S. Post Office ZipCodes	The set of U.S. Post Office ZipCodes
Priority	Trouble Ticket	Trouble Ticketing/Fault Management	The set of trouble ticket priorities	The set of trouble ticket priority designators
Privilege-Group-ID	Privilege Group	Generic	The set of privilege groups	The set of integers > 0
Privilege-Group-ID	User Privilege Group	Generic	The set of privilege groups	The set of privilege group designators
Privilege-Level	User	Generic	The set of system user privilege levels	The set of system user privilege levels
Province	Location	Generic	The set of provinces of foreign countries	The set of provinces of foreign country designators
Quantity-Damaged	Received Consumable Object	Inventory Management	The set of numbers that denote the number of consumables determined to be damaged on arrival	The set of integers > 0
Quantity-Per-Unit-Of-Issue	Received Consumable Object	Inventory Management	The set unit of issue quantities { 12/dozen, 6/6-pack, 500/ream, ... }	The set unit of issue quantities { 12/dozen, 6/6-pack, 500/ream, ... }
Quantity-Received	Received Consumable Object	Inventory Management	The set of integers that denote the quantity of received items	The set of integers > 0
Question	Question	User Comment Survey	The set of survey questions	The set of questions in text
Question-ID	Answer	User Comment Survey	The set of question designators for which an answer has been given	The set of question designators
Question-ID	Category Question	User Comment Survey	The set of survey questions that have been assigned to a category	The set of question designators
Question-ID	Question	User Comment Survey	The set of identifiers contained on surveys	The set of question designators
Receipt-Date	Received Consumable Object	Inventory Management	The set of dates on which	The set of dates

**Table 5.4-1. CSMS Data Specifications Sorted by Attribute**

Attribute Name	Table Name	Model Substructure	Attribute Description	Domain
			consumables are received	
Recertification-Reason	Certification	Training	The set of reasons for being recertified	The set texts used to denote reasons for being recertified
Recipient-First-Name	Order	Order Processing	The set of order recipient first names	The set of order recipient first names
Recipient-Last-Name	Order	Order Processing	The set of order recipient last names	The set of order recipient last names
Recipient-Middle-Initials	Order	Order Processing	The set of order recipient middle initials	The set of order recipient middle initials
Recipient-Organization-Name	Order	Order Processing	The set of organizations to which order recipients belong	The set of organization names to which order recipients belong
Recipient-Telephone-Numuber	Order	Order Processing	The set of order recipient telephone numbers, including country code	The set of order recipient telephone numbers
Recipient-Title	Order	Order Processing	The set of order recipient titles	The set of order recipient titles
Recommendation-Date	Recommended Corrective Action	Trouble Ticketing/Fault Management	The set of dates of recommended corrective actions	The set of dates
Recommended-Corrective-	Recommended Corrective Action-ID	Trouble Ticketing/Fault Action	The set of recommended corrective Management actions	The set of integers > 0
Release-ID	Operational Baseline	Configuration Management	The set of operational baseline releases	The set of release designators
Release-ID	Operational Baseline Version	Configuration Management	The set of operational baseline releases	The set of Operational Baseline Release designators
Release-ID	Operational Baseline Version Control Item	Configuration Management	The set of operational baseline releases	The set of Operational Baseline Release designators
Requested-Media-Type	Order	Order Processing	The set of media types	The set of media type designators
Retrieved-Data-Description	Suborder Request	Order Processing	The set of retrieved data descriptions	The set of retrieved data descriptions
Retrieved-Data-Size	Suborder Request	Order Processing	The set of retrieved product sizes	The set of real numbers



**Table 5.4-1. CSMS Data Specifications Sorted by Attribute**

Attribute Name	Table Name	Model Substructure	Attribute Description	Domain
Retrieved-Data-Size-Units	Suborder Request	Order Processing	The set of retrieved product size units of measure	The set of retrieved product size unit of measure designators
Review-Board-Directive-ID	Review Board Directive	Trouble Ticketing/Fault Management	The set of Review Board directives	The set of integers > 0
Revision	Document Item	Inventory Management	The set of revision identifiers of Documents that are part of ECS	The set of revision identifiers
Revision	Software Item	Inventory Management	The set of revision numbers assigned by manufacturers	The set of software item version identifiers
Security-Level	Order Line Item	Order Processing	The set of security levels	The set of Security Level designations
Serial-Number	Item	Inventory Management	The set of manufacturer's assigned serial numbers items	The set of item serial numbers assigned by the manufacturer of the item
Severity	Fault	Trouble Ticketing/Fault Management	The set of fault severities	The set of fault severity designators
Shipping-Building	Order	Order Processing	The set of building names given in order shipping addresses	The set of Building designators given in order shipping addresses
Shipping-City	Order	Order Processing	The set of Cities	The set of City names
Shipping-Cost	Order Line Item	Order Processing	The set of shipping costs in real numbers, rounded to two digits, in dollars	The set of real numbers rounded to two decimal places
Shipping-Country	Order	Order Processing	The set of Countries	The set of Country names
Shipping-Floor	Order	Order Processing	The set of floors specified in order shipping addresses	The set of Floor designators given in order shipping addresses
Shipping-Location-Name	Order	Order Processing	The set of shipping location names	The set of Shipping Location Names
Shipping-Location-Organization	Order	Order Processing	The set of shipping location organizations, i.e. the recipient organization, if there is one	The set of Shipping Location Organization designators
Shipping-Mail-Stop	Order	Order Processing	The set of mail stops given as part	The set of mail stop

**Table 5.4-1. CSMS Data Specifications Sorted by Attribute**

Attribute Name	Table Name	Model Substructure	Attribute Description	Domain
			of shipping addresses	designators
Shipping-Organization-Name	Order	Order Processing	The set of shipping organizations	The set of names of shipping organizations
Shipping-Post-Office-Box	Order	Order Processing	The set of post office boxes	The set of Post Office Box designators
Shipping-Postal-Code	Order	Order Processing	The set of postal codes given in shipping addresses	The set of postal codes given in shipping addresses
Shipping-State	Order	Order Processing	The set of states within countries	The set of State names for States within countries
Shipping-Street-Address	Order	Order Processing	The set of Street/Route/Road/Avenue/Boulevard/Highway/Court/Circle name and number designations given for product shipping	The set of Street/Route/Road/Avenue/Boulevard/Highway/Court/Circle name and number designations given for product shipping
Shipping-Suite	Order	Order Processing	The set of suites designated in order shipping addresses	The set of Suite designations given in order shipping addresses
Shipping-US-Government-Code	Order	Order Processing	The set of internal mail distribution codes for US Government offices, given in shipping addresses	The set of internal mail distribution codes for US Government offices, given in shipping addresses
Shipping-Volume	Received Consumable Object	Inventory Management	The set of item volumes as packaged for shipping	The set of real numbers rounded to two decimal places
Shipping-Volume-Unit-Of-Received Measure	Consumable Object	Inventory Management	The set of volumetric units of measure {cubic feet, cubic inch, cubic meter, ...}	The set of volumetric units of measure {cubic feet, cubic inch, cubic meter, ...}
Shipping-Weight	Received Consumable Object	Inventory Management	The set of received consumables shipping weights	The set of real numbers rounded to two decimal places
Shipping-Weight-Unit-Of-Issue	Received Consumable Object	Inventory Management	The set of weight units of measure {pounds, tons, kilograms, ...}	The set of weight units of measure {pounds, tons, kilograms, ...}
Skill-Description	Required Certification Skill	Training	The set of skill descriptions	The set of skill descriptions

**Table 5.4-1. CSMS Data Specifications Sorted by Attribute**

Attribute Name	Table Name	Model Substructure	Attribute Description	Domain
Skill-ID	Required Certification Skill	Training	The set of skill areas for which certification is required {MSS Database administrator, System Performance Determination, ...}	The set of skill areas for which certification is required {MSS Database administrator, System Performance Determination, ...}
Software-Configuration-ID-Level	Software Control Item	Configuration Management	The set of designations {CSU,CSC} which denote "Configured Software Unit", and "Configured Software Component", respectively	{CSU, CSC}
Software-Control-Item-Type	Software Control Item	Configuration Management	{Commercial-Off-the-Shelf, Custom}	The set of denotations of software control item types
Software-Type	Software Item	Inventory Management	The set of software types {COTS, custom, ...}	The set of software types {COTS, custom, ...}
Start-Date	Attended Training Course	Training	The set of Attended Training Course Scheduled Start Dates	The set of dates
Start-Date	Corrective Action	Trouble Ticketing/Fault Management	The set of start dates for corrective actions	The set of dates after 1/1/97
Start-Date	DAAC Employee Position	Generic	The set of dates on which employees start work at a position	The set of dates after 1/1/97
Start-Date	Scheduled Training Course	Training	The set of training course start dates	The set of dates
Start-Date	SMC Employee Position	Generic	The set of SMC employee position start dates	The set of SMC Employee Position start dates
Start-Date	Training Course Document	Training	The set of training course start dates	The set of training course start dates
Start-Time	Corrective Action	Trouble Ticketing/Fault Management	The set of start times for corrective actions	The set of times on a 24 hour clock
State	ECS Center	Generic	The set of states in the U.S. in which ECS centers are located	{Alaska, South Dakota, California, Maryland, Alabama, Virginia, Tennessee, Colorado, Michigan}
State	Location	Generic	The set of U.S. Cities	The set of U.S. City designators
Status	Suborder Request Status	Order Processing	The set of order line item state	The set of order line item

**Table 5.4-1. CSMS Data Specifications Sorted by Attribute**

Attribute Name	Table Name	Model Substructure	Attribute Description	Domain
	Change		changes	status codes
Street-Address	ECS Center	Generic	The set of Street Addresses for ECS Centers	{4800 Oak Grove Drive, 977 Explorer Boulevard, Campus Box 449}
Street-Address	Location	Generic	The set of street, road, avenue, route, place, court identifier and distinguishing number used by the U.S. Postal Service in mailing addresses	The street, road, avenue, route, place, court identifier and distinguishing number used by the U.S. Postal Service in mailing addresses
Suborder-Request-ID	Suborder Request	Order Processing	The set of Retrieved Data identifiers	The set of integers > 0
Suborder-Request-ID	Suborder Request	Order Processing	The set of suborder requests that have child suborder requests	The set of integers > 0
Suborder-Request-ID	Suborder Request Status Change	Order Processing	The set of suborder requests	The set of integers > 0
Suborder-Request-Receipt-Date	Suborder Request	Order Processing	The set of line item receipt dates	The set of line item receipt date designators
Suborder-Request-Receipt-Time	Suborder Request	Order Processing	The set of line item receipt times	The set of line item receipt time designators
Suite	Location	Generic	The set of Suite addresses	The set of Suite addresses
Suspected-Fault-ID	Suspected Fault	Trouble Ticketing/Fault Management	The set of suspected faults reported in a trouble ticket	The set of integers > 0
Telephone-Number	Manufacturer Point of Contact	Inventory Management	The set of telephone numbers provided by manufacturers for their point of contact	The set of international telephone numbers
Telephone-Number	Vendor Point of Contact	Inventory Management	The set of vendor point of contact telephone numbers	The set of international telephone numbers
Termination-Date	Item Operational State	Inventory Management	The set of item operational state termination dates	The set of item state termination date designators
Termination-Time	Item Operational State	Inventory Management	The set of item operational state termination times	The set of item state termination time designators
Territory	Location	Generic	The set of U.S. Territories, or foreign country territories	The set of U.S. Territories, or foreign country

**Table 5.4-1. CSMS Data Specifications Sorted by Attribute**

Attribute Name	Table Name	Model Substructure	Attribute Description	Domain	
				territory designators	
Time	Account State	Accounting	The set of times on which accounts changed to their current state	The set of times on a 24 hour clock	
Time	Suborder Request Status Change	Order Processing	The set of times on which an order line item status change occurs	The set of times	
Title	Document Control Item	Configuration Management	The set of document control item titles	The set of Control Item Document Titles	
Title	User	Generic	The set of user titles	The set of User titles	
Title	Vendor Point of Contact	Inventory Management	The set of vendor point of contact titles	The set of vendor point of contact titles	
Training-Course-Description	Training Course	Training	The set of training course descriptions	The set of training course descriptions	
Training-Course-ID	Attended Training Course	Training	The set of Training Courses	The set of training course designators	
Training-Course-ID	Scheduled Training Course	Training	The set of Training Courses	The set of training course designators	
Training-Course-ID	Training Course	Training	The set of Training Courses	The set of training course designators	
Training-Course-ID	Training Course	Training	The set of prerequisite training courses	The set of prerequisite training courses	
Training-Course-ID	Training Course Document	Training	The set of training courses	The set of integers > 0	
Training-Course-Subject-Area	Training Course	Training	The set of training course subject areas {MSS RDB Design, SDPS RDB Design, Sybase System 10 Fast Track to SQL Server, ...}	The set of training course subject areas {MSS RDB Design, SDPS RDB Design, Sybase System 10 Fast Track to SQL Server, ...}	
Training-Course-Title	Training Course	Training	The set of training course titles	The set of training course titles	
Training-Course-Training-	Training Course	Training	The set of training methods Method instruction, hands-on simulation, ...}	The set of training methods {self-administered, classroom classroom instruction, hands-on simulation, ...}	{self-administered,
Trouble-Ticket-ID	Review Board Directive	Trouble Ticketing/Fault	The set of trouble tickets subject	The set of integers > 0	

**Table 5.4-1. CSMS Data Specifications Sorted by Attribute**

Attribute Name	Table Name	Model Substructure	Attribute Description	Domain
		Management	to a review board directive	
Trouble-Ticket-ID	Suspected Fault	Trouble Ticketing/Fault Management	The set of trouble tickets that identify suspected faults in the system	The set of integers > 0
Trouble-Ticket-ID	Suspected Faulty Item	Trouble Ticketing/Fault Management	The set of trouble tickets	The set of integers > 0
Trouble-Ticket-ID	Trouble Ticket	Trouble Ticketing/Fault Management	The set of trouble tickets that are opened in response to another trouble ticket, usually from another ECS Center	The set of integers > 0
Trouble-Ticket-ID	Trouble Ticket	Trouble Ticketing/Fault Management	The set of a trouble tickets	The set of integers > 0
Unit-Cost	Media	Inventory Management	The set of media unit costs in dollars	The set of real numbers rounded to two decimal places
Unit-Of-Issue	Received Consumable Object	Inventory Management	The set of units of issue {dozen, gross, ream, 6-pack, ...}	The set of units of issue {dozen, gross, ream, 6-pack, ...}
US-Government-Mailing-Code	ECS Center	Generic	The set of U.S. Government Internal Mail Codes at ECS Centers	{157B}
User's-Principal-Investigator	User	Generic	The set of principal investigators	The set of principal investigator full names
User-ID	Answer	User Comment Survey	The set of users who answer survey questions	The set of integers > 0
User-ID	ECS Employee	Generic	The set of users who are ECS Employees	The set of integers > 0
User-ID	Individual Account	Accounting	The set of users who have individual accounts	The set of integers > 0
User-ID	Order	Order Processing	The set of users	The set of integers > 0
User-ID	Survey Comment	User Comment Survey	The set of users	The set of integers > 0
User-ID	Trouble Ticket	Trouble Ticketing/Fault Management	The set of users who cause trouble tickets to be opened	The set of integers > 0
User-ID	User	Generic	The set of users	The set of integers > 0

**Table 5.4-1. CSMS Data Specifications Sorted by Attribute**

Attribute Name	Table Name	Model Substructure	Attribute Description	Domain
User-ID	User Privilege Group	Generic	The set of users	The set of integers > 0
User-ID-Assignment-Time	User	Generic	The set of times of the day at which the SMC assigns a user ID	The set of times on a 24 hour clock
User-Login-Assignment-Date	User	Generic	The set of dates on which the SMC assigns a login ID to a user	The set of dates
User-Project	User	Generic	The set of user projects	The set of user project designations
Vendor-ID	Item	Inventory Management	The set of vendors who sell items used by ECS	The set of integers > 0
Vendor-ID	Vendor	Inventory Management	The set of vendors	The set of integers > 0
Vendor-ID	Vendor Location	Inventory Management	The set of vendors	The set of integers > 0
Vendor-ID	Vendor Point of Contact	Inventory Management	The set of vendors who sell items used by ECS	The set of integers > 0
Vendor-Name	Vendor	Inventory Management	The set of vendors	The set of vendor names
Vendor-Type	Vendor	Inventory Management	The set of vendor types	The set of vendor types
Version	Document Control Item	Configuration Management	The set of document control item versions	The set of Document Control Item version designators
Version	Software Control Item	Configuration Management	The set of software control item versions	The set of software control item version designations
Version	Software Item	Inventory Management	The set of version numbers assigned by manufacturers	The set of real numbers > 0
Version-Assignment-Date	Operational Baseline Version	Configuration Management	The set of version assignment dates	The set of version assignment date designators
Version-ID	Operational Baseline Version	Configuration Management	The set of operational baseline versions	The set of Operational Baseline Version designators
Version-ID	Operational Baseline Version Control Item	Configuration Management	The set of operational baseline versions	The set of Operational Baseline Version designators
Volume	Consumable	Inventory Management	The set of numbers denoting the packaged volume of a consumable	The set of real numbers > 0
Volume-Units-of-Measure	Consumable	Inventory Management	The set of volumetric units of	The set of volumetric units

**Table 5.4-1. CSMS Data Specifications Sorted by Attribute**

Attribute Name	Table Name	Model Substructure	Attribute Description	Domain
			measure	of measure
Volume-Units-of-Measure	Hardware Control Item	Configuration Management	The set of volumetric units of measure	The set of volumetric units of measure
Weight	Consumable	Inventory Management	The set of numbers denoting the packaged weight of a consumable item	The set of real numbers > 0
Weight	Hardware Control Item	Configuration Management	The set of hardware control item weights	The set of real numbers > 0
Weight-Units-of-Measure	Consumable	Inventory Management	The set of weight units of measure	The set of weight units of measure
Weight-Units-of-Measure	Hardware Control Item	Configuration Management	The set of weight units of measure	The set of weight units of measure
ZIP-Code	ECS Center	Generic	The set of ZIP Codes for the ECS Centers	The set of ZIP Codes for the ECS Centers



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## 6. CSMS Internal Data Model

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### 6.1 Introduction

The internal data model is the second piece of the framework for the three schema approach. The information necessary to generate the internal schema is included in this section and is initially presented in a normalized form (third normal form). Later, it will be denormalized in order to fully support object implementation. This internal schema will form the foundation for creating the vendor-independent database schema. The current system design will use the Sybase System 10 Database Management System. The ECS MSS Data Base Management System (DBMS) is implemented using relational tables in Sybase System 10.

### 6.2 CSMS Internal Model (Relational Tables)

Sybase table structures are provided below along with associated attributes that define significant related properties. The Sybase-mandatory information for database implementation shown in the following set of database tables are table name, attribute, key designation, null value constraints, and data type and size.

Additional information is included to relate the parent table to those attributes that are foreign keys. Domain values for these attributes are listed in the attribute specification in Section 5.4. These values are generally implemented as static tables to maintain the search and data update integrity of the Sybase production database.

We are currently designing the internal tables which will be used to contain performance related information, so we have not included them in this version of the document. We have included, as Appendix D, the description of the ECS Application MIB from which the application related performance values should be drawn.

**Table 6.2-1 Internal Model Tables**

Model Substructure/ Table Name	Attribute Name	Nulls Allowed	Data Type	Data Size	Primary Key Attribute	Referenced Foreign Key Table
<u>Accounting</u>  Account	Account-Number	No	Int	4	PK	
	Account-Type	Yes	Text(n)	2000		
	Current Balance	Yes	smallmoney	4		
	Established-Date	Yes	smalldatetime	4		
	Initial-Balance	Yes	smallmoney	4		
Account State	Account-Number	No	Int	4	PK	Account
	Account-State	No	varchar(n)	20	PK	
	Date	No	smalldatetime	4	PK	
	Time	No	smalldatetime	4	PK	
Authorized Group Account User	Account-Number	No	Int	4	PK	Group Account
	Account-Number	No	Int	4	PK	Individual Account
	Authorization-Date	No	smalldatetime	4		
	Authorization-Time	No	smalldatetime	8		
Group Account	Account-Limit	Yes	smallmoney	4		
	Account-Number	No	Int	4	PK	Account
	Organization-ID	No	Int	4		Organization
Individual Account	Account-Number	No	Int	4	PK	Account

**Table 6.2-1 Internal Model Tables**

Model Substructure/ Table Name	Attribute Name	Nulls Allowed	Data Type	Size	Data Attribute	Primary Key	Referenced Foreign Key Table
Organization	User-ID	No	Int	4			User
	Location-ID	Yes	Int	4			Location
	Location-ID	No	Int	4			Location
	Organization-ID	No	Int	4	PK		
	Organization-Name	No	varchar(n)	50			
	Point-Of-Contact-FAX-Number	Yes	Int	4			
	Point-Of-Contact-First-Name	Yes	varchar(n)	20			
	Point-Of-Contact-Last-Name	Yes	varchar(n)	20			
	Point-of-Contact-Middle-Initial	Yes	varchar(n)	1			
	Point-Of-Contact-Phone-Number	Yes	Int	4			
	Point-Of-Contact-Title	Yes	varchar(n)	20			
<b><u>Configuration Management</u></b>							
Control Item	Control-Item-ID	Yes	Int	4			Control Item
	Control-Item-ID	No	Int	4	PK		
	Control-Item-Name	No	varchar(n)	50			
	Control-Item-Type	Yes	varchar(n)	21			
Document Control Item	Control-Item-ID	No	Int	4	PK		Control Item

**Table 6.2-1 Internal Model Tables**

Model Substructure/ Table Name	Attribute Name	Nulls Allowed	Data Type	Size	Data Attribute	Primary Key	Referenced Foreign Key Table
	Document-Type	Yes	varchar(n)	20			
	Title	No	varchar(n)	50			
	Version	Yes	varchar(n)	4			
Hardware Control Item							
	Control-Item-ID	No	Int	4	PK		Control Item
	Packaged-Volume	Yes	Real	4			
	Volume-Units-of-Measure	Yes	varchar(n)	20			
	Weight	Yes	Real	4			
	Weight-Units-of-Measure	Yes	varchar(n)	20			
Operational Baseline							
	Approval-Date	Yes	smalldatetime	4			
	Baseline-ID	No	varchar(n)	20	PK		
	ECS-Center-ID	No	varchar(n)	50	PK		ECS-Center
	Effective-Date	Yes	smalldatetime	4			
Operational Baseline Version	Release-ID	No	varchar(n)	1	PK		
	Baseline-ID	No	varchar(n)	20	PK		Operational Baseline
	ECS-Center-ID	No	varchar(n)	50	PK		Operational Baseline
	Release-ID	No	varchar(n)	1	PK		Operational Baseline
	Version-Assignment-Date	Yes	smalldatetime	4			
Operational Baseline Version Control Item	Version-ID	No	varchar(n)	2	PK		
	Authority-ID	Yes	varchar(n)	50			

**Table 6.2-1 Internal Model Tables**

Model Substructure/ Table Name	Attribute Name	Nulls Allowed	Data Type	Data Size	Primary Key Attribute	Referenced Foreign Key Table
Operations Document	Authorization-Date	Yes	smalldatetime	4		
	Baseline-ID	No	varchar(n)	20	PK	Operational Baseline Version
	Control-Item-ID	No	Int	4	PK	Control Item
	ECS-Center-ID	No	varchar(n)	50	PK	Operational Baseline Version
	Release-ID	No	varchar(n)	1	PK	Operational Baseline Version
	Version-ID	No	varchar(n)	2	PK	Operational Baseline Version
	Control-Item-ID	No	Int	4	PK	Document Control Item
	Control-Item-ID	No	Int	4	PK	Control Item
	Software-Configuration-ID-Level	No	varchar(n)	3		
	Software-Control-Item-Type	Yes	varchar(n)	10		
Generic	Version	Yes	varchar(n)	4		
	DAAC					
	ECS-Center-ID	No	varchar(n)	4	PK	ECS Center
	DAAC Employee Position					
	ECS-Center-ID	No	varchar(n)	50	PK	DAAC Position
	Employee-ID	No	Int	4	PK	ECS Employee
	End-Date	Yes	smalldatetime	8		
	Position-Title	No	varchar(n)	50	PK	DAAC Position
	Start-Date	No	smalldatetime	4		

**Table 6.2-1 Internal Model Tables**

Model Substructure/ Table Name	Attribute Name	Nulls Allowed	Data Type	Data Size	Primary Key Attribute	Referenced Foreign Key Table
DAAC Position	ECS-Center-ID	No	varchar(n)	50	PK	DAAC
	Position-Description	Yes	Text(n)	2000		
	Position-Title	No	varchar(n)	50	PK	
ECS Center	Building	Yes	varchar(n)	10		
	City	Yes	varchar(n)	17		
	ECS-Center-ID	No	varchar(n)	50	PK	
	ECS-Center-Type	No	varchar(n)	4		
	Floor	Yes	varchar(n)	1		
	Location-Organization-Name	Yes	varchar(n)	50		
	State	Yes	varchar(n)	25		
	Street-Address	Yes	varchar(n)	50		
	US-Government-Mailing-Code	Yes	varchar(n)	10		
ECS Employee	ZIP-Code	Yes	varchar(n)	9		
	Employee-First-Name	No	varchar(n)	20		
	Employee-ID	No	Int	4	PK	
	Employee-Last-Name	No	varchar(n)	20		
	Middle-Initial	Yes	varchar(n)	1		
Location	User-ID	Yes	Int	4		User
	Building	Yes	varchar(n)	50		

**Table 6.2-1 Internal Model Tables**

Model Substructure/ Table Name	Attribute Name	Nulls Allowed	Data Type	Size	Data Attribute	Primary Key	Referenced Foreign Key Table
	City	Yes	varchar(n)	50			
	Code	Yes	varchar(n)	10			
	Country	Yes	varchar(n)	50			
	County	Yes	varchar(n)	50			
	Floor	Yes	varchar(n)	8			
	Location-ID	No	Int	4		PK	
	Location-Name	Yes	varchar(n)	50			
	Location-Organization-Name	Yes	varchar(n)	50			
	Mail-Stop	Yes	varchar(n)	7			
	P.O. Box	Yes	varchar(n)	50			
	Postal-Code	Yes	varchar(n)	9			
	Province	Yes	varchar(n)	50			
	State	Yes	varchar(n)	50			
	Street-Address	Yes	varchar(n)	50			
	Suite	Yes	varchar(n)	50			
	Territory	Yes	varchar(n)	50			
Privilege Group							
	Description	Yes	Text(n)	2000			
	Privilege-Group-ID	No	Int	4		PK	
SMC							
	ECS-Center-ID	No	varchar(n)	10		PK	ECS Center
SMC Employee Position							
	ECS-Center-ID	No	varchar(n)	10		PK	SMC Position



**Table 6.2-1 Internal Model Tables**

Model Substructure/ Table Name	Attribute Name	Nulls Allowed	Data Type	Size	Data Primary Key Attribute	Referenced Foreign Key Table
SMC Position	Employee-ID	No	Int	4	PK	ECS Employee
	End-Date	Yes	smalldatetime	4		
	Position-Title	No	varchar(n)	15	PK	SMC Position
	Start-Date	No	smalldatetime	4		
User	ECS-Center-ID	No	varchar(n)	31	PK	SMC
	Position-Description	Yes	Text(n)	2000		
	Position-Title	No	varchar(n)	50	PK	
User	Email-Address	Yes	varchar(n)	20		
	FAX-Number	Yes	varchar(n)	13		
	First-Name	No	varchar(n)	20		
	Last-Name	No	varchar(n)	20		
	Location-ID	Yes	Int	4		Location
	Location-ID	Yes	Int	4		Location
	Location-ID	No	Int	4		Location
	Middle-Initial	Yes	varchar(n)	1		
	Organization	Yes	varchar(n)	50		
	Password	Yes	varchar(n)	10		
	Phone-Number	Yes	varchar(n)	13		
	Privilege-Level	Yes	varchar(n)	2		
	Title	Yes	varchar(n)	50		
	User's-Principal-Investigator	Yes	varchar(n)	50		

**Table 6.2-1 Internal Model Tables**

Model Substructure/ Table Name	Attribute Name	Nulls Allowed	Data Type	Size	Data Attribute	Primary Key	Referenced Foreign Key Table
User Privilege Group	User-ID	No	Int	4		PK	
	User-ID-Assignment-Time	No	smalldatetime	4			
	User-Login-Assignment-Date	No	smalldatetime	4			
	User-Project	Yes	varchar(n)	50			
	Creation-Date	Yes	smalldatetime	4			
	Creation-Time	Yes	smalldatetime	4			
	Privilege-Group-ID	No	Int	4		PK	Privilege Group
	User-ID	No	Int	4		PK	User
<b><u>Inventory Management</u></b>							
Consumable	Consumable-Object-ID	No	varchar(n)	50		PK	
	Consumable-Type	Yes	varchar(n)	50			
	Description	Yes	Text(n)	2000			
	Manufacturer-ID	No	Int	4		PK	Manufacturer
	Volume	Yes	Real	4			
	Volume-Units-of-Measure	Yes	varchar(n)	10			
	Weight	Yes	Real	4			
	Weight-Units-of-Measure	Yes	varchar(n)	10			
Directory	Directory-ID	Yes	varchar(n)	50			Directory
	Directory-ID	No	varchar(n)	50		PK	
	Host-ID	No	Int	4		PK	System Hardware Item

**Table 6.2-1 Internal Model Tables**

Model Substructure/ Table Name	Attribute Name	Nulls Allowed	Data Type	Size	Data Attribute	Primary Key	Referenced Foreign Key Table
Document Item	Document-Title	No	varchar(n)	50			
	Item-ID	No	Int	4	PK		Item
	Revision	Yes	varchar(n)	2			
Hardware Item	Host-ID	Yes	varchar(n)	25			
	Installed-Location	Yes	varchar(n)	50			
	Item-ID	No	Int	4	PK		Item
	Model-Number	Yes	varchar(n)	20			
Item	Deployment-State	Yes	varchar(n)	20			
	ECS-Center-ID	No	varchar(n)	50			ECS Center
	Item-Assembly-Level	Yes	varchar(n)	50			
	Item-Description	Yes	Text(n)	2000			
	Item-ID	No	Int	4	PK		
	Item-ID	Yes	Int	4			Item
	Item-Name	Yes	varchar(n)	50			
	Item-Type	No	varchar(n)	50			
	Manufacturer-ID	Yes	Int	4			Manufacturer
	Manufacturer-Item-ID	Yes	varchar(n)	50			
	Part-Number	Yes	varchar(n)	20			
	Serial-Number	Yes	varchar(n)	50			
	Vendor-ID	Yes	Int	4			Vendor

**Table 6.2-1 Internal Model Tables**

Model Substructure/ Table Name	Attribute Name	Nulls Allowed	Data Type	Size	Data Primary Key Attribute	Referenced Foreign Key Table
Item Consumption	Consumable-Object-ID	No	varchar(n)	50	PK	Consumable
	Item-ID	No	Int	4	PK	Item
	Manufacturer-ID	No	Int	4	PK	Consumable
Item Maintenance	Employee-ID	No	Int	4	PK	ECS Employee
	Item-ID	No	Int	4	PK	Item
	Maintenance-End-Date	Yes	smalldatetime	4		
	Maintenance-End-Time	Yes	smalldatetime	4		
	Maintenance-Procedure	No	varchar(n)	50	PK	
	Maintenance-Start-Date	No	smalldatetime	4	PK	
	Maintenance-Start-Time	Yes	smalldatetime	4		
	Maintenance-Type	Yes	varchar(n)	50		
Item Operational State	Initiation-Date	No	smalldatetime	4	PK	
	Initiation-Time	No	smalldatetime	4	PK	
	Item-ID	No	Int	4	PK	Item
	Item-Operational-State	No	varchar(n)	50	PK	
	Termination-Date	Yes	smalldatetime	4		
	Termination-Time	Yes	smalldatetime	4		
Maintenance Contract	Contract-ID	No	varchar(n)	30	PK	
	Description	Yes	Text(n)	2000		

**Table 6.2-1 Internal Model Tables**

Model Substructure/ Table Name	Attribute Name	Nulls Allowed	Data Type	Size	Data Attribute	Primary Key	Referenced Foreign Key Table
Manufacturer	Effective-Date	No	smalldatetime	4			
	Expiration-Date	No	smalldatetime	4	PK		
	Item-ID	No	Int	4			Item
	Manufacturer-ID	Yes	Int	4			Manufacturer
	Manufacturer-Description	Yes	Text(n)	2000			
	Manufacturer-ID	No	Int	4	PK		
Manufacturer Location	Manufacturer-Name	No	varchar(n)	50			
	Location-ID	No	Int	4	PK		Location
	Manufacturer-ID	No	Int	4	PK		Manufacturer
Manufacturer Point of Contact	Manufacturer-ID	No	Int	4	PK		Manufacturer
	Point-Of-Contact-Email-Address	Yes	varchar(n)	20			
	Point-Of-Contact-FAX-Number	Yes	varchar(n)	13			
	Point-Of-Contact-First-Name	No	varchar(n)	20			
	Point-Of-Contact-ID	No	varchar(n)	50	PK		
	Point-Of-Contact-Last-Name	No	varchar(n)	20			
	Telephone-Number	No	varchar(n)	13			
Media	Manufacturer-ID	No	Int	4	PK		Consumable
	Media-Consumable-Object-ID	No	varchar(n)	50	PK		Consumable

**Table 6.2-1 Internal Model Tables**

Model Substructure/ Table Name	Attribute Name	Nulls Allowed	Data Type	Size	Data Attribute	Primary Key	Referenced Foreign Key Table
Received Consumable Object	Media-Description	Yes	Text(n)		2000		
	Media-Size	Yes	varchar(n)	50			
	Media-Type	Yes	varchar(n)	50			
	Unit-Cost	Yes	smallmoney	4			
	Consumable-Object-ID	No	varchar(n)	50		PK	Consumable
	ECS-Center-ID	No	varchar(n)	50		PK	ECS Center
	Manufacturer-ID	No	Int	4		PK	Consumable
	Quantity-Damaged	Yes	Int	4			
	Quantity-Per-Unit-Of-Issue	No	Int	4			
	Quantity-Received	No	Int	4			
	Receipt-Date	No	smalldatetime	4		PK	
	Shipping-Volume	Yes	Real	4			
	Shipping-Volume-Unit-Of-Measure	Yes	varchar(n)	20			
Software Item	Shipping-Weight	Yes	Real	4			
	Shipping-Weight-Unit-Of-Issue	Yes	varchar(n)	20			
	Unit-Of-Issue	No	varchar(n)	20			
	Directory	Yes	varchar(n)	50			Directory
	File-ID	Yes	varchar(n)	64			
	Item-ID	No	Int	4		PK	Item
	Item-ID	Yes	Int	4			Directory
	License-Expiration-Date	Yes	smalldatetime	4			

**Table 6.2-1 Internal Model Tables**

Model Substructure/ Table Name	Attribute Name	Nulls Allowed	Data Type	Size	Data Attribute	Primary Key	Referenced Foreign Key Table
Vendor	Licensed-Installation-Quantity	Yes	Int	4			
	Revision	Yes	varchar(n)	4			
	Software-Type	Yes	varchar(n)	20			
	Version	Yes	Real	4			
Vendor	Vendor-ID	No	Int	4		PK	
	Vendor-Name	No	varchar(n)	50			
	Vendor-Type	Yes	varchar(n)	50			
Vendor Location	Location-ID	No	Int	4		PK	Location
	Vendor-ID	No	Int	4		PK	Vendor
Vendor Point of Contact	Email-Address	Yes	varchar(n)	20			
	FAX-Number	Yes	varchar(n)	13			
	First-Name	No	varchar(n)	20			
	Last-Name	No	varchar(n)	20			
	Middle-Initial	Yes	varchar(n)	1			
	Point-Of-Contact-ID	No	Int	4		PK	
	Telephone-Number	No	varchar(n)	13			
	Title	Yes	varchar(n)	30			
	Vendor-ID	No	Int	4		PK	Vendor

### **Mode Management**

Item Mode

**Table 6.2-1 Internal Model Tables**

Model Substructure/ Table Name	Attribute Name	Nulls Allowed	Data Type	Size	Data Primary Key Attribute	Referenced Foreign Key Table
Mode Database	Begin-Date	No	smalldatetime	4	PK	
	Begin-Time	No	smalldatetime	4	PK	
	Employee-ID	No	Int	4		ECS Employee
	End Time	Yes	smalldatetime	4		
	End-Date	Yes	smalldatetime	4		
	Item-ID	No	Int	4	PK	Item
	Mode-ID	No	varchar(n)	20	PK	
Order Processing	Begin-Date	No	smalldatetime	4	PK	Item Mode
	Begin-Time	No	smalldatetime	4	PK	Item Mode
	Database-ID	No	varchar(n)	50	PK	
	Item-ID	No	Int	4	PK	Item Mode
	Mode-ID	No	varchar(n)	20	PK	Item Mode
Order	Confirmation-Code	Yes	Int	4		
	Confirmation-Date	Yes	smalldatetime	4		
	Confirmation-Time	Yes	smalldatetime	4		
	ECS-Center-ID	No	varchar(n)	50	PK	DAAC
	Order-Date	No	smalldatetime	4		
	Order-ID	No	Int	4	PK	
	Order-Priority	No	Int	4		
	Order-Time	No	smalldatetime	4		



**Table 6.2-1 Internal Model Tables**

Model Substructure/ Table Name	Attribute Name	Nulls Allowed	Data Type	Size	Data Primary Key Attribute	Referenced Foreign Key Table
	Recipient-First-Name	No	varchar(n)	20		
	Recipient-Last-Name	No	varchar(n)	25		
	Recipient-Middle-Initials	Yes	varchar(n)	1		
	Recipient-Organization-Name	Yes	varchar(n)	50		
	Recipient-Telephone-Numuber	Yes	varchar(n)	15		
	Recipient-Title	Yes	varchar(n)	25		
	Requested-Media-Type	Yes	varchar(n)	50		
	Shipping-Building	Yes	varchar(n)	50		
	Shipping-City	Yes	varchar(n)	50		
	Shipping-Country	No	varchar(n)	50		
	Shipping-Floor	Yes	varchar(n)	10		
	Shipping-Location-Name	Yes	varchar(n)	50		
	Shipping-Location-Organization	Yes	varchar(n)	50		
	Shipping-Mail-Stop	Yes	varchar(n)	8		
	Shipping-Organization-Name	Yes	varchar(n)	50		
	Shipping-Post-Office-Box	Yes	varchar(n)	10		
	Shipping-Postal-Code	Yes	varchar(n)	20		
	Shipping-State	Yes	varchar(n)	50		
	Shipping-Street-Address	Yes	varchar(n)	50		
	Shipping-Suite	Yes	varchar(n)	10		
	Shipping-US-Government-Code	Yes	varchar(n)	10		
	User-ID	No	Int	4		User

Order Line Item

**Table 6.2-1 Internal Model Tables**

Model Substructure/ Table Name	Attribute Name	Nulls Allowed	Data Type	Size	Data Attribute	Primary Key	Referenced Foreign Key Table
Suborder Request	Consumable-Object-ID	Yes	varchar(n)	50			Media
	ECS-Center-ID	No	varchar(n)	50	PK		Order
	Estimated-Processing-Time	Yes	Real	4			
	Estimated-Processing-Time-Units-of-Measure	Yes	varchar(n)	10			
	Line-Item-ID	No	Int	4	PK		
	Manufacturer-ID	Yes	Int	4			Media
	Media-Format	Yes	varchar(n)	50			
	Media-Quantity	Yes	Int	4			
	Order-ID	No	Int	4	PK		Order
	Security-Level	No	varchar(n)	10			
	Shipping-Cost	No	smallmoney	4			
	Data-Retrieval-Date	Yes	smalldatetime	4			
	Data-Retrieval-Time	Yes	smalldatetime	4			
	ECS-Center-ID	No	varchar(n)	50	PK		DAAC
	ECS-Center-ID	No	varchar(n)	50	PK		Order Line Item
	Line-Item-ID	No	Int	4	PK		Order Line Item
	Order-ID	No	Int	4	PK		Order Line Item
	Retrieved-Data-Description	Yes	Text(n)	2000			
	Retrieved-Data-Size	Yes	Real	4			
	Retrieved-Data-Size-Units	Yes	varchar(n)	20			
Suborder Request	Suborder-Request-ID	Yes	Int	4			Suborder Request
	Suborder-Request-ID	No	Int	4	PK		

**Table 6.2-1 Internal Model Tables**

Model Substructure/ Table Name	Attribute Name	Nulls Allowed	Data Type	Data Size	Primary Key Attribute	Referenced Foreign Key Table
Suborder Request Status Change	Suborder-Request-Receipt-Date	No	smalldatetime	4		
	Suborder-Request-Receipt-Time	No	smalldatetime	4		
	Comment	Yes	Text(n)	2000		
	Date	No	smalldatetime	4	PK	
	ECS-Center-ID	No	varchar(n)	50	PK	Suborder Request
	ECS-Center-ID	No	varchar(n)	50	PK	Status Request
	Line-Item-ID	No	Int	4	PK	Suborder Request
	Order-ID	No	Int	4	PK	Suborder Request
	Status	No	varchar(n)	25	PK	
	Suborder-Request-ID	No	Int	4	PK	Status Request
<b>Training</b>	Time	No	smalldatetime	4	PK	
	Attended Training Course					
	Employee-ID	No	Int	4	PK	Employee
	Evaluation	Yes	Text(n)	2000		
	Location-ID	No	Int	4		Training Course Location
	Start-Date	No	smalldatetime	4	PK	Training Course Location
Certification	Training-Course-ID	No	varchar(n)	30	PK	Training Course Location
	Certification-Date	No	smalldatetime	4		

**Table 6.2-1 Internal Model Tables**

Model Substructure/ Table Name	Attribute Name	Nulls Allowed	Data Type	Size	Data Primary Key Attribute	Referenced Foreign Key Table
Curriculum	Certification-Method	Yes	varchar(n)	50		
	Curriculum-ID	No	varchar(n)	30	PK	Curriculum
	Curriculum-Year	No	varchar(n)	4	PK	Curriculum
	Employee-ID	No	Int	4	PK	ECS-Employee
	Expiration-Date	Yes	smalldatetime	4		
	Recertification-Reason	Yes	Text(n)	2000		
Curriculum Course	Curriculum-Description	Yes	Text(n)	2000		
	Curriculum-ID	No	varchar(n)	30	PK	
	Curriculum-Year	No	Int	4	PK	
Required Certification Skill	Curriculum-ID	No	varchar(n)	30	PK	Curriculum
	Curriculum-Training-Course	No	Int	4	PK	Training Course
	Curriculum-Year	No	Int	4	PK	Curriculum
Scheduled Training Course	Curriculum-ID	No	varchar(n)	30	PK	Curriculum
	Curriculum-Year	No	varchar(n)	4	PK	Curriculum
	Skill-Description	No	Text(n)	2000		
	Skill-ID	No	varchar(n)	20	PK	
	Completion-Date	Yes	smalldatetime	4		
	Cost	Yes	smallmoney	4		

**Table 6.2-1 Internal Model Tables**

Model Substructure/ Table Name	Attribute Name	Nulls Allowed	Data Type	Size	Data Attribute	Primary Key	Referenced Foreign Key Table
Training Course	Enrollment-Limit	Yes	Int	4			
	Instructor-First-Name	Yes	varchar(n)	20			
	Instructor-Last-Name	Yes	varchar(n)	20			
	Location-ID	No	Int	4	PK		Location
	Start-Date	No	smalldatetime	4	PK		
	Training-Course-ID	No	varchar(n)	30	PK		Training Course
	Training-Course-Description	Yes	Text(n)	2000			
	Training-Course-ID	No	varchar(n)	30	PK		
	Training-Course-ID	Yes	varchar(n)	30			
	Training-Course-Subject-Area	Yes	varchar(n)	30			
Training Course Document	Training-Course-Title	No	varchar(n)	50			
	Training-Course-Training-Method	Yes	varchar(n)	50			
	Control-Item-ID	No	Int	4	PK		Training Document
	Location-ID	No	Int	4	PK		Scheduled Training Course
	Start-Date	No	smalldatetime	4	PK		Scheduled Training Course
Training Document	Training-Course-ID	No	Int	4	PK		Scheduled Training Course
	Control-Item-ID	No	Int	4	PK		Document Control Item

## **Trouble**

**Table 6.2-1 Internal Model Tables**

Model Substructure/ Table Name	Attribute Name	Nulls Allowed	Data Type	Data Size	Primary Key Attribute	Referenced Foreign Key Table
<u>Ticketing/Fault Management</u>  Confirmed Item Fault	Fault-Confirmation-Date	No	smalldatetime	4	PK	
	Fault-Confirmation-Time	No	smalldatetime	4	PK	
	Fault-ID	No	Int	4	PK	Fault
	Item-ID	No	Int	4	PK	Item
Corrective Action	Completion-Date	Yes	smalldatetime	4		
	Completion-Time	Yes	smalldatetime	4		
	Corrective-Action-ID	No	Int	4	PK	
	Description	Yes	Text(n)	2000		
	Fault-Confirmation-Date	No	smalldatetime	4	PK	Confirmed Item Fault
	Fault-Confirmation-Time	No	smalldatetime	4	PK	Confirmed Item Fault
	Fault-ID	No	Int	4	PK	Confirmed Item Fault
	Item-ID	No	Int	4	PK	Confirmed Item Fault
	Start-Date	No	smalldatetime	4		
Fault	Start-Time	No	smalldatetime	4		
	Fault-Description	No	Text(n)	2000		
	Fault-ID	No	Int	4	PK	
	Fault-Type	Yes	varchar(n)	20		
Recommended Corrective	Severity	Yes	varchar(n)	20		

**Table 6.2-1 Internal Model Tables**

Model Substructure/ Table Name Action	Attribute Name	Nulls Allowed	Data Type	Size	Data Primary Key Attribute	Referenced Foreign Key Table
Recommended Corrective Action Directive	Confirmation-Date	No	smalldatetime	4	PK	Confirmed Item Fault
	Confirmation-Time	No	smalldatetime	4	PK	Confirmed Item Fault
	Confirmed-Fault-ID	No	Int	4	PK	Confirmed Item Fault
	Description	Yes	Text(n)	2000		
	Item-ID	No	Int	4	PK	Confirmed Item Fault
	Recommendation-Date	Yes	smalldatetime	4		
	Recommended-Corrective-Action-ID	No	Int	4	PK	
Review Board Directive	Description	No	Text(n)	2000		
	Directive-Date	No	smalldatetime	4		
	Directive-ID	No	Int	4	PK	
	Fault-Confirmation-Date	No	smalldatetime	4	PK	Confirmed item Fault
	Fault-Confirmation-Time	No	smalldatetime	4	PK	Confirmed Item Fault
	Fault-ID	No	Int	4	PK	Confirmed item Fault
	Item-ID	No	Int	4	PK	Confirmed Item Fault
Suspected Fault	Description	No	Text(n)	2000		
	ECS-Center-ID	No	varchar(n)	50	PK	Trouble Ticket
	Issue-Date	No	smalldatetime	4		
	Review-Board-Directive-ID	No	Int	4	PK	
	Trouble-Ticket-ID	No	Int	4	PK	Trouble Ticket

**Table 6.2-1 Internal Model Tables**

Model Substructure/ Table Name	Attribute Name	Nulls Allowed	Data Type	Data Size	Primary Key Attribute	Referenced Foreign Key Table
Suspected Faulty Item	ECS-Center-ID	No	varchar(n)	50	PK	Trouble Ticket
	Suspected-Fault-ID	No	Int	4	PK	
	Trouble-Ticket-ID	No	Int	4	PK	Trouble Ticket
Trouble Ticket	ECS-Center-ID	No	varchar(n)	50	PK	Suspected Fault
	Fault-ID	No	Int	4	PK	Suspected Fault
	Item-ID	No	Int	4	PK	Item
	Trouble-Ticket-ID	No	Int	4	PK	Suspected Fault
User Comment Survey	Close-Date	Yes	smalldatetime	4		
	Close-Time	Yes	smalldatetime	4		
	ECS-Center-ID	No	varchar(n)	50	PK	Trouble Ticket
	ECS-Center-ID	Yes	varchar(n)	50		Operator
	Open-Date	No	smalldatetime	4		
	Open-Time	No	smalldatetime	4		
	Priority	Yes	varchar(n)	10		
	Trouble-Ticket-ID	No	Int	4	PK	
	Trouble-Ticket-ID	Yes	Int	4		Trouble Ticket
	User-ID	No	Int	4		Operator
Answer	Answer	Yes	varchar(n)	200		
	Question-ID	No	varchar(n)	4	PK	Question



**Table 6.2-1 Internal Model Tables**

Model Substructure/ Table Name	Attribute Name	Nulls Allowed	Data Type	Data Size	Primary Key Attribute	Referenced Foreign Key Table
Category	User-ID	No	Int	4	PK	User
	Category-ID	No	varchar(n)	50	PK	
	Description	Yes	varchar(n)	200		
	Icon-Prefix	Yes	varchar(n)	50		
Category Question	Category-ID	No	varchar(n)	50	PK	Category
	Question-ID	No	varchar(n)	4	PK	Question
Question	Question	No	varchar(n)	200		
	Question-ID	No	varchar(n)	4	PK	
Survey Comment	Category-ID	No	varchar(n)	50	PK	Category
	Comment	Yes	varchar(n)	200		
	User-ID	No	Int	4	PK	User

## 7. CSMS External Data Model

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### 7.1 Introduction

The external data model completes the framework for the three schema approach. The external model is a logical model that represents the views of the enterprise's data as perceived by the end user. These models are the user's windows into the database, where the "user" in some cases may be a software application, a COTS package, or a person who is using the data stored in the MgtDBMS to generate reports. For physical implementation, these views are further decomposed into various scenarios illustrating the query capability of the system.

### 7.2 COTS Interface Schema

The Earth Observing System Data Information System (EOSDIS) Core System (ECS) uses a variety of Commercial Off the Shelf (COTS) packages as part of its implementation strategy. Each of these packages maintains its own view of the data it is using. Each of these views describes a subset of the information contained in the Conceptual Model. Each COTS package contains as part of its documentation a description of the schema that it is using. Instead of copying each of those schema in this volume, we have included in Table 7.2-1 references to the location of each COTS package's schema. In the notes column of this table we have included general information of interest about the data storage methodology used by the package.

**Table 7.2-1 Location of COTS Schema Descriptions (1 of 2)**

Application	Tool	Documentation of COTS Schema	Notes
Network Management	Hewlett Packard OpenView	HP Open View Network Node Manager Administrators Reference	uses its own flat files, ECS is customizing what is being stored
System Performance Management	Tivoli TME/Sentry	Tivoli/Enterprise Console Users Guide	uses Sybase RDBMS for storing data
Extensible SNMP Agent	Peer Networks Optima	Optima SNMP Master Tool kit	
Trouble Ticket Software	Remedy Corporation ARS	Users Guide for OSF/Motif	uses Sybase RDBMS for storing data - customized for ECS

**Table 7.2-1 Location of COTS Schema Descriptions (2 of 2)**

Application	Tool	Documentation of COTS Schema	Notes
Security/DCE Management	Hal DCE Cell Manager	DCE Cell Manager Users Guide	
Software Change Management	Atria Clear/Case	Clear Case Reference Manual	customized for ECS
Change Request Management	Puresoft DDTS	Administrators Manual PureDDTS and Users Manual PureDDTS	customized for ECS
Baseline Manager	HTG XRP	XRP-II System Reference Manual	uses Unify RDBMS for storing data
Software Distribution	Trivoli Courier	Tivoli/Enterprise Console Users Guide	
Report Writer	RFP in progress		
Statistical Analysis & Performance Trending	RFP in progress		
Software License	FLEXIm and iFOR/LS	Managing Software Products with the Network License System and for FLEXIm - URL = <a href="http://www.globetrotter.com">http://www.globetrotter.com</a>	
Inventory & Logistics Management	RFP in progress		
Training Management	Office Automation tool - Sun WABI		
Billing and Accounting	RFP in Progress		

## 7.3 Log and Event Views

In the ECS system, there are four types of log files being created, the management log, application logs, COTS logs, and client logs.

The management log contains information on management events. This log is maintained and controlled by MSS. This log may contain information that both the application and the subagent can create. The interface to the management log is not visible to the ECS software developer. Writing to the management log is managed by the application event manager and the subagent event manager(MsAgEventManager). Mode management variables, trace level information and the accepted log levels set in the subagent and application event managers control writing to the logs. The management log is the primary source of data for the MgtDBMS. A list of fields that are currently defined for the management log are provided in Table 7.3-1. The table includes the fields that can appear in the Management Log events with a description of values, and the provider of the information. The management log event is extensible by using the paramType-paramValue pair to allow applications to include specific information by defining the name of the attribute and it's associated value.

**Table 7.3-1. Management Log Event Fields (1 of 2)**

Event Field	Description or values	Provider
eventID	Event identifier	EcAgEvent
eventCategory	Config, Status, Threshold, Error, Alert	Application
eventType	System error, Startup, Stop, Process failed, Threshold exceeded, Access attempts	Application
eventSubType	More granular types: I/O error, Insufficient memory	Application
eventMode	The mode of this event: operational or test.	Application
priority	Low, Medium Low, Medium, High	Application
timestamp	The date and time the event was sent.	EcAgEvent
subsys	Identifies the subsystem where the event occurred.	Application
csci	Identifies the CSCI where the event occurred.	Application
appID	The identifier of the application package	EcAgManager/Monitor
progID	The identifier of the program	EcAgManager/Monitor
procPID	ID of the process where the event occurred.	EcAgManager/Monitor
InstanceID	The instance ID of the running application package	EcAgManager/Monitor
transactionID	UUID of the transaction	Application
transactionParentID	UUID of the parent transaction	Application
MgmtSvrObjID	The object ID of the EcAgManager of the application.	EcAgManager
msg	The message of the event	Application

**Table 7.3-1. Management Log Event Fields (2 of 2)**

Event Field	Description or values	Provider
<b>Either</b>		
numTuples	The number of tuples below	EcAgEvent
paramType	The type of the parameter	Application
paramValue	The value of the parameter	Application
<b>Or</b>		
numPerfMetrics	The number of performance metrics below	MsAgPerfEvent
procPerfType	The defined performance metric	MsAgMonitor
procPerfValue	The value of the performance metric	MsAgMonitor
procPerfFaultThreshold	The threshold to cause this as a fault event	MsAgMonitor
procPerfRearmFaultThd	The rearm value of the Fault threshold	MsAgMonitor
procPerfMaxThreshold	The upper limit threshold to send out Threshold Exceeded event	MsAgMonitor
procPerfRearmMaxThd	The rearm value of the upper limit threshold	MsAgMonitor
procPerfMinThreshold	The lower limit to send out Threshold Exceeded event	MsAgMonitor
procPerfRearmMinThd	The rearm value of the lower limit threshold	MsAgMonitor

The application logs contain information that an ECS application records for its own purposes. The contents of the application log are controlled by mode management variables and the trace level currently active. The application log may contain debug information and other events that an application can generate. Logging to the application log is controlled by the Application Event Manager. The application logs are not being captured into the MgtDBMS.

The COTS packages also maintain log files for their private use. For example, ClearCase, a software configuration management tool, maintains 14 log files for use by the various modules within the package. These log files typically have the same attributes stored within them: error date; error time; error software module; current user; and an error-specific message. In certain cases, for example Hewlett Packard's OpenView and Tivoli, events are recorded in these logs on the actual performance of the system. In these cases, the events containing information necessary for performance monitoring will be selected from these log files and processed for input to the MgtDBMS.

The Client Log is used by ECS clients to log events. It resides on the same platform that the client software (e.g. desktop) runs. The client log is created/deleted by the ECS user. Any number of client logs can be created. The size of the client log is not managed by the ECS.

## **7.4 CSMS Attributes Related to Reports**

The primary purpose of the MgtDBMS is to support management's requirement for analysis and decision support on the operation of the ECS. This analysis will be performed by management and operations staff at both the local site and the SMC. Some of the decision support and

analysis requirements will be supported with pre-defined and developed reports. Other situations may require adhoc analysis of the data stored in the management database. Data Engineering is currently working with the release design teams in verifying that the data necessary for generation of standard management reports from the MgtDBMS is available in the database. As a result of this work in progress, the information shown in Table 7.4-1 has been collected and is being verified. It should be noted that this effort is currently being finalized by the Release A team and then will be extended and finalized with the Release B team. It should also be noted that some of the standard management reports will be generated directly by the subsystems and are not included here. These subsystem generated reports are defined in the appropriate volume of DID 305. As this effort is completed, the information included in the reports will be mapped to the MgtDBMS attributes.

**Table 7.4-1. ECS Management Reports (1 of 7)**

<b>ECS Management Report</b>	<b>Description</b>	<b>Information included in the report</b>
<b>User System Access Profile</b>	produced monthly, with totals saved into database for future reports - produced at local DAAC and at SMC	DAAC User Type Access Type Total Number of Accesses Gateway Response time to Completion Avg. Gateway Response time to Completion Max. Gateway Response time to Initial Response Avg. Gateway Response time to Initial Response Max. Average Client Session Time Number of Granules Max. Throughput per hour
<b>System Access Profile</b>	There will another version of <b>User System Access Profile</b> by DAAC, AccessType - showing totals for all users. The report is produced at both the DAAC and the SMC. The report is produced monthly.	DAAC Access Type Total Number of Accesses Gateway Response time to Completion Avg. Gateway Response time to Completion Max Gateway Response time to Initial Response Avg. Gateway Response time to Initial Response Max Average Client Session Time Number of Granules Max Throughput per Hour

**Table 7.4-1. ECS Management Reports (2 of 7)**

<b>ECS Management Report</b>	<b>Description</b>	<b>Information included in the report</b>
<b>Collection Access</b>	Provides counts of the number of accesses of each collection at each DAAC by Access Type. The report is produced at both the DAAC and the SMC monthly.	DAAC Collection Access Type Total Number of Accesses
<b>Distinct Users</b>	This report displays the number of distinct users (userids) accessing each DAAC by Access Type. The report is generated both at the DAAC and the SMC monthly.	DAAC Access Type Number of Distinct Users
<b>Order and Distribution Error Summary</b>	The report provides summaries of error occurrences during the reporting period, grouped and sorted by type of error, type of product, and type of distribution media. The report will be produced locally at the DAACs on a monthly basis.	Type of Product Distribution Media Error Severity Error Category Error Type Error Subtype Error Message Count Frequency Order Number
<b>Data Set Order History</b>	This report provides order performance and volume statistics for each product group (e.g., dataset or collection) for the reporting period, and lists the most frequently ordered products. For Release A the report will be produced locally at the DAAC monthly.	Product Type Product Instance Number of Bytes Number of Files Count
<b>Media Distribution Profile.</b>	This report provides statistics on methods of data distribution for a specified reporting period, such as Electronic Distribution via various transfer mechanisms, and hard media distribution by media type. It is produced monthly at both the local DAAC and the SMC.	Media Type Number of Request for Media Number of Bytes per Request Number of Volumes Frequency

**Table 7.4-1. ECS Management Reports (3 of 7)**

<b>ECS Management Report</b>	<b>Description</b>	<b>Information included in the report</b>
<b>Distribution Performance</b>	This report shows the average elapsed time each request spends in each processing state. The report is produced weekly at the DAAC from the Management Database.	Request ID Requestor Volume Media Type Number of physical Volumes Number of Files Number of Granules Output Format Request Priority Quality Processing State Average Elapsed time
<b>Distribution Throughput Performance</b>	This graphical report shows the average and total number of requests logged by state across a time interval.	Request State Time Period Average Number of Requests Maximum Number of Requests
<b>Ingest Data Set History</b>	The report supplies operations staff with a view of ingest operation by request granule. The report can be generated for specified time periods and executed on a regular basis. It provides a detailed log of the ingest requests, broken down by <i>data category</i> , information about <i>current status</i> , and <i>summary statistics similar to the request history report</i> .	Order ID Data Type ID External Data Provider Ingest Type Data Volume Number of files Start Time Time to Preprocess Time to Archive Warm Start Flag Final Status Avg. time to Preprocess Max time to Preprocess Avg. time to Archive Max time to Archive Granule Transfer Rate



**Table 7.4-1. ECS Management Reports (4 of 7)**

<b>ECS Management Report</b>	<b>Description</b>	<b>Information included in the report</b>
<b>Ingest Errors</b>	The Ingest Error Report is a summary report of the frequency of errors of different types encountered during ingest processing. The report consists of two sections--Data Set Summary and Error Class Summary. The Data Set Summary lists a count of reported errors, by error class, for each data set type. The Error Class Summary lists a count of reported errors for each error class	Error Class Summary - Message ID Message Mnemonic Count Frequency  Data Set Summary - Data set Type Severity Message ID Number of requests for data set type Count of Error Frequency of Error
<b>Registered User Characterization</b>	This summary report will include information on ECS users identifying each user affiliation, the number of registered users in each class and a categorization of their interests. It is to be produced monthly at both the local DAACs and at the SMC from User Profile information in the Management Database. The SMC version of the report will include a summary of all DAACs in one report and a grand total..	Affiliation Discipline/Interest Number of Users
<b>ECS Services Summary</b>	Summary statistics on the feedback received from the user community at User Services. Produced monthly at the DAAC with summary forwarded to the SMC for monthly SMC reporting. The report will be prepared from the Management Database with information on number of logons and orders coming from events processed by MDA and stored in the management database, and counts by category exported by Remedy into a file which will be input to the Management database..	Contact Category Count Percent of Logons Percent of Orders

**Table 7.4-1. ECS Management Reports (5 of 7)**

<b>ECS Management Report</b>	<b>Description</b>	<b>Information included in the report</b>
<b>User System Access Profile</b>	This generic report will report user usage by User Affiliation or anything else in the User Profile along with resource usage statistics from information in the Management DB. This report includes registered users, guests, and DAAC personnel. The report will be produced monthly at the DAAC and at the SMC.	Affiliation Avg. Session Duration Max Session Duration Total # Inventory Searches Avg. # Inventory Searches Max # Inventory Searches Total # Directory Searches Avg. # Directory Searches Max # Directory Searches Total # FTP Browsers Avg. # FTP Browsers Max # FTP Browsers Total # Integrated Browsers Avg. # Integrated Browsers Max # Integrated Browsers Total # Product Requests Avg. # Product Requests Max # Product Requests
<b>Disk Capacity Report</b>	The report supplies operations staff with a detail view of the current disk capacity. The report will be generated from the Management DB.	Host Local Disk Partition Disk Space Used Disk Space Available Total Disk Space

**Table 7.4-1. ECS Management Reports (6 of 7)**

<b>ECS Management Report</b>	<b>Description</b>	<b>Information included in the report</b>
<b>Network Errors</b>	The report supplies operations staff with a detail and summary view of SNMP events reported to HP Open View. The logged events are presented in chronological order, with the most recent events presented at the bottom of the list. The operator can set filters for the events to be displayed in the log, clear filters, view a description for a selected event in the log, delete events from the log report, sort events, print events, or save the log report to file.	Subnet Network Device Host/Host Interface Type of Network Error Time Period Number of Network Errors IN Number of Network Errors OUT Total Number of Network Errors Total Number of Inbound Packets in Period Total Number of Outbound Packets in Period Total IN Errors as Percentage of Inbound Packets Total OUT Errors as Percentage of Outbound Packets Total (IN & OUT) as Percentage of Total Packets
<b>Host Errors</b>	This report provides a summary of the types of errors/faults logged for each host at the site over an operator-specified period of time. Reported faults include: Performance Degradation (as measured against thresholds); CPU errors; Memory errors; Disk errors; File system errors; Archive errors; Network errors; Queue errors; Critical processes missing; Processes looping; Processes failed; Cron jobs missing; NFS errors	Time Period Host Host Component Error Severity Error Category Error Type Error SubType Error Detail Number of Errors
<b>Moderation Status Report</b>	This reports shows current moderation status.	Advertising Group Advertisements Submitted Approved Rejected Pending Average Moderation Time Max. Moderation Time

**Table 7.4-1. ECS Management Reports (7 of 7)**

<b>ECS Management Report</b>	<b>Description</b>	<b>Information included in the report</b>
<b>Host Logins</b>	Provides a count of users who successfully logged in or had their passwords revoked. The report will be produced from the Management database weekly.	Host Number of successful Logins Number of Failed Logins
<b>Authentication Failures for ACLS</b>	Listing of the authentication failures that occurred. The report will be produced weekly from the management database.	Userid ACLname Host Date/Time
<b>Returned Products Report</b>	The report will provide summary information on returned orders each month. The report will be produced both at the local site and the SMC from the Management Database.	DAAC Total Orders Received Product Type Media Type Reason for Return Number of Orders Returned Action
<b>User Services Performance Report</b>	This report will provide management an overview of the types of user requests being handled by user services staff. It will be generated locally and at the SMC from the Management database.	DAAC Total Orders Received Contact Method Type Count As Percent of Orders Received

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## Appendix A. Attribute Mapping to DID 305

This appendix consists of our initial attempt at mapping the attributes described in DID 311 to the OMT class and attributes found in DID 305. This mapping is in a preliminary stage, and is included here to demonstrate how we propose to document the mappings. The table is organized by attribute name and includes model substructure and table name to facilitate referencing Sections 5 and 6 of this document.

**Table A.1. Attribute Mapping to DID 305 (1 of 4)**

Attribute Name	Table Name	Model Substructure	OMT Class ID	OMT Attribute ID
Account-Number	Account	Accounting	MsAcUsrProfile, MsAcUsrRequest	accountNumber, accountNumber
Account-Number	Account State	Accounting	MsAcUsrProfile, MsAcUsrRequest	accountNumber, accountNumber
Account-State	Account State	Accounting	MsAcUsrRequest	status
City	Location	Generic	city, mailAddr, altMailAddr, shipAddr, altShipAddr, billAddr	MsAcAddress, MsAcUsrProfile, MsAcUsrProfile, MsAcUsrProfile, MsAcUsrProfile
Code	Location	Generic	mailAddr, altMailAddr, shipAddr, altShipAddr, billAddr	MsAcUsrProfile, MsAcUsrProfile, MsAcUsrProfile, MsAcUsrProfile, MsAcUsrProfile
Comment	Suborder Request Status Change	Order Processing	description	EcRequestEvent
Country	Location	Generic	country, mailAddr, altMailAddr, shipAddr, altShipAddr, billAddr	MsAcAddress, MsAcUsrProfile, MsAcUsrProfile, MsAcUsrProfile, MsAcUsrProfile, MsAcUsrProfile
County	Location	Generic	mailAddr, altMailAddr, shipAddr, altShipAddr, billAddr	MsAcUsrProfile, MsAcUsrProfile, MsAcUsrProfile, MsAcUsrProfile, MsAcUsrProfile
Current Balance	Account	Accounting	MsAcUsrProfile	accountBalance
Date	Account State	Accounting	MsAcUsrRequest	requestDate
Date	Suborder Request Status Change	Order Processing	requestStartTime, requestDate	EcRequestEvent, MsAcUsrRequest

**Table A.1. Attribute Mapping to DID 305 (2 of 4)**

Attribute Name	Table Name	Model Substructure	OMT Class ID	OMT Attribute ID
ECS-Center-ID	Order	Order Processing	homeDAAC	EcOrderEvent
ECS-Center-ID	Order Line Item	Order Processing	homeDAAC	EcOrderEvent
ECS-Center-ID	Suborder Request Status Change	Order Processing	homeDAAC	EcOrderEvent, MsAcUsrRequest
Email-Address	User	Generic	emailAddr	MsAcUsrProfile
Established-Date	Account	Accounting	creationDate	creationDate
Estimated-Processing-Time	Order Line Item	Order Processing	activeTime	EcRequestEvent
FAX-Number	User	Generic	fax	MsAcAddress
First-Name	User	Generic	firstName, userName	MsAcUsrName, MsAcUsrProfile
Floor	Location	Generic	mailAddr, altMailAddr, shipAddr, altShipAddr, billAddr	MsAcUsrProfile, MsAcUsrProfile, MsAcUsrProfile, MsAcUsrProfile, MsAcUsrProfile
Last-Name	User	Generic	lastName	McAcUsrName
Line-Item-ID	Order Line Item	Order Processing	parentID	EcSubOrderEvent
Line-Item-ID	Suborder Request Status Change	Order Processing	parentID, requestID	EcSubOrderEvent, EcRequestEvent
Location-ID	Organization	Accounting	billAddr	MsAcUsrProfile
Location-Organization-Name	Location	Generic	organization	MsAcUsrProfile
Mail-Stop	Location	Generic	mailAddr, altMailAddr, shipAddr, altShipAddr, billAddr	MsAcUsrProfile, MsAcUsrProfile, MsAcUsrProfile, MsAcUsrProfile, MsAcUsrProfile
Manufacturer-ID	Order Line Item	Order Processing	mediaTypeList, mediaPref	EcSubOrderEvent, MsAcUsrRequest
Media-Quantity	Order Line Item	Order Processing	mediaCountList	EcSubOrderEvent
Middle-Initial	User	Generic	middleInit	McAcUsrName
Order-ID	Order Line Item	Order Processing	parentID	EcSubOrderEvent
Order-ID	Suborder Request Status Change	Order Processing	parentID, requestID	EcSubOrderEvent, EcRequestEvent
Organization	User	Generic	organization, organization, affiliation	MsAcDCEAcct, MsAcUsrProfile, MsAcUsrProfile
Organization-Name	Organization	Accounting	affiliation, sponsor	MsAcUsrProfile, MsAcUsrProfile

**Table A.1. Attribute Mapping to DID 305 (3 of 4)**

Attribute Name	Table Name	Model Substructure	OMT Class ID	OMT Attribute ID
P.O. Box	Location	Generic	mailAddr, altMailAddr, shipAddr, altShipAddr, billAddr	MsAcUsrProfile, MsAcUsrProfile, MsAcUsrProfile, MsAcUsrProfile, MsAcUsrProfile
Password	User	Generic	password	MsAcDCEAcct
Phone-Number	User	Generic	phone, telNum	MsAcAddress, MsAcUsrProfile
Point-Of-Contact-First-Name	Organization	Accounting	usrName	MsAcUsrProfile
Point-Of-Contact-Last-Name	Organization	Accounting	usrName	MsAcUsrProfile
Point-of-Contact-Middle-Initial	Organization	Accounting	usrName	MsAcUsrProfile
Postal-Code	Location	Generic	zip, mailAddr, alt-MailAddr, shipAddr, altShipAddr, billAddr	MsAcAddress, MsAcUsrProfile, MsAcUsrProfile, MsAcUsrProfile, MsAcUsrProfile, MsAcUsrProfile
Privilege-Level	User	Generic	privilegeLevel	MsAcUsrProfile
Province	Location	Generic	mailAddr, altMailAddr, shipAddr, altShipAddr, billAddr	MsAcUsrProfile, MsAcUsrProfile, MsAcUsrProfile, MsAcUsrProfile, MsAcUsrProfile
Recipient-First-Name	Order	Order Processing	shipToName	EcOrderEvent
Recipient-Last-Name	Order	Order Processing	shipToName	EcOrderEvent
Recipient-Middle-Initials	Order	Order Processing	shipToName	EcOrderEvent
Recipient-Organization-Name	Order	Order Processing	shipToName	EcOrderEvent
Shipping-Building	Order	Order Processing	shipAddress	shipAddress
Shipping-City	Order	Order Processing	shipAddress	EcOrderEvent
Shipping-Country	Order	Order Processing	shipAddress	EcOrderEvent
Shipping-Floor	Order	Order Processing	shipAddress	EcOrderEvent
Shipping-Location-Name	Order	Order Processing	shipToName	EcOrderEvent
Shipping-Location-Organization	Order	Order Processing	shipToName	EcOrderEvent
Shipping-Post-Office-Box	Order	Order Processing	shipToName	EcOrderEvent



**Table A.1. Attribute Mapping to DID 305 (4 of 4)**

Attribute Name	Table Name	Model Substructure	OMT Class ID	OMT Attribute ID
Shipping-Postal-Code	Order	Order Processing	shipAddress	EcOrderEvent
Shipping-State	Order	Order Processing	shipAddress	EcOrderEvent
Shipping-Street-Address	Order	Order Processing	shipAddress	EcOrderEvent
Shipping-Suite	Order	Order Processing	shipAddress	EcOrderEvent
Shipping-US-Government-Code	Order	Order Processing	shipAddress	EcOrderEvent
State	Location	Generic	state, mailAddr, altMailAddr, shipAddr, altShipAddr, billAddr	MsAcAddress, MsAcUsrProfile, MsAcUsrProfile, MsAcUsrProfile, MsAcUsrProfile, MsAcUsrProfile
Status	Suborder Request Status Change	Order Processing	state, status	EcRequestEvent, MsAcUsrRequest
Street-Address	Location	Generic	street1, street2, mailAddr, altMailAddr, shipAddr, altShipAddr, billAddr	MsAcAddress, MsAcAddress, MsAcUsrProfile, MsAcUsrProfile, MsAcUsrProfile, MsAcUsrProfile, MsAcUsrProfile
Suite	Location	Generic	mailAddr, altMailAddr, shipAddr, altShipAddr, billAddr	MsAcUsrProfile, MsAcUsrProfile, MsAcUsrProfile, MsAcUsrProfile, MsAcUsrProfile
Territory	Location	Generic	mailAddr, altMailAddr, shipAddr, altShipAddr, billAddr	MsAcUsrProfile, MsAcUsrProfile, MsAcUsrProfile, MsAcUsrProfile, MsAcUsrProfile
Time	Suborder Request Status Change	Order Processing	requestStartTimerequestDate	EcRequestEvent, MsAcUsrRequest
Title	User	Generic	title	MsAcUsrName
User's-Principal-Investigator	User	Generic	principal(?), PI	MsAcDCEAcct, MsAcUsrProfile
User-ID	Order	Order Processing	userId	EcOrderEvent
User-ID	User	Generic	userID	MsAcRegUser
User-Login-Assignment-Date	User	Generic	creationDate	MsAcUsrProfile

## Appendix B. Database Interface Object

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### B1. Introduction.

An interface class or object is the collection of software that allows for the bi-directional messaging between two separate host hardware devices or software. The need exists for an interface class for the ECS MgtDBMS to provide for a controlled delivery of subsystem specific data into the database of record and for a controlled delivery of information back to these subsystems as requested.

### B2. Purpose

The purpose of the this database interface class is to allow for messaging from all ECS subsystems to the MgtDBMS and from the MgtDBMS to each of these subsystems. This messaging will be both for event notification as required and for the transfer of critical data from the subsystems to the MSS database and from the MSS to the subsystems.

### B3. Scope

The scope of this database interface class will include, but not be limited to, the following four high level functions of operations:

- Delivery of data from subsystems to the MSS database tables to append to or update the production MSS data
- Delivery of data to specific subsystems from the MgtDBMS via pre-defined queries
- Messaging to appropriate subsystems or the MSS if critical events occur
- Definition of procedures for selective archive and data transfer to the SMC and for the ongoing maintenance of site-specific databases

### B4. Class Specifications:

**Name:** EcMdDBInterface

**Parent Class:** None

**Public:** No

**Distributed Object:** No

**Persistent Class:** True

**Purpose:** Provides for the interface between the MSS management database and all other subsystems needing an interface to the MgtDBMS.

**Attributes:**

The persistent attributes associated with this class will include DBname (for the subsystem database name, the SQLString (for SQL calls made from the subsystem to the MgtDBMS) and Filename (for file handles that will be part of batch operations to and/or from the MgtDBMS). Additional attributes necessary to support the following operations are in the process of being defined.

**Methods/Operations:**

BatchUpdt: This operation will provide for the delivery of data from other subsystems (via MDA, COTS software, ASCII files) to the production MSS database. Data will be delivered to a staging area, and processed for eventual inclusion into the MgtDBMS.

ApplQuery: This operation will provide the querying of the MSS database from other subsystem processes. This operation will be constructed via Sybase Open Client. It will provide for the capability to get any and all data of interest from the MgtDBMS.

BatchOut: This operation will provide for the delivery of data from the MgtDBMS to the SMC and DAAC's as requested. Monthly or annual historical data, as an example, would be delivered to facilitate trend reporting.

BatchRept: This operation will produce a set of pre-defined management reports on a scheduled basis. These reports will be constructed using the Structured Query Reporting (SQR) scripting language.

DBAAccess: This operation is a collection of procedures for maintenance of site-specific databases. It will include low-level maintenance items like ongoing mode and hardware management as well as high-level system management maintenance including SA Companion, and Enterprise SQL Server Manager

MsgUpdt: This operation allows for the instantaneous notification to and from the MgtDBMS and the subsystems for events deemed to be urgent, critical, or catastrophic. Events that are candidates for messaging include critical faults and outages.

## Appendix C. Future Directions

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### C.1 Future Direction of CSMS Release B DID 311 Document Content

Even though CSMS Release B DID 311 is considered final at this delivery it is the intention of MRS Data Engineering (DE) to continue work with Release B Development Engineering, the Release B Management Subsystem, and the other Release B Subsystems to maintain a Data Model and specifications that tracks and is consistent with the Release B design. This is expected to be an iterative process where the Data Model, in some instances, will further refine the design and in other instances design and implementation considerations will drive the data model. As this process proceeds, MRS DE will continue its periodic meetings with our ESDIS Counterparts and will provide updates to the evolving Business Rules, Data Flow Diagrams, Specifications, Mappings, and entity Relationship Diagrams. In turn, ESDIS comments and questions resulting from these meetings will be resolved and reflected in the Data Model when appropriate. This forum will also continue to be used as a method to raise and resolve policy issues that impact the Data Model. The end product of this process will be a delivered as-built data model for Release B.

### C.2 Release B Management Database Prototype

MRS DE will also continue to iterate the Release A Database, working with the Release A subsystems and Development Engineering. This effort, as well as supporting Release A development, will also be used to identify and resolve Release A and B data engineering integration issues. MRS DE, as a part of the Release A requirement, will deliver a MSS Management Database at the LSM's and SMC. This Database will support DAAC and ECS Release A management reporting requirements. The delivered release A MgtDBMS will be used as the starting point for a Release B prototype Management Data Base. This prototype database will be used for the following:

- To continue the development of the Management Database Interface Class described in Appendix B. This will include modification of the Release A interface operations to meet Release B requirements and the addition of additional interface operations for example, a near real time interface to support additional Release B function.
- To evaluate database backup and recovery procedures.
- To evaluate database performance issues.
- To determine Management Database role in the integration of data across subsystems.
- To evaluate methods for data sharing between DAAC's.
- To evaluate methods for data sharing between the SMC and DAAC's
- To refine data requirements and evaluate the model.

By using the Release A MgtDBMS as a Release B prototype we will achieve maximum leverage of the Release A development effort and assure a minimization of Release A and B database integration issues.

## Appendix D. ECS Application MIB

---

Below is the current ECS Application MIB which will be used for the collection of management information from applications for the management database.

```
-- Copyright (copyright mark) 1996, Hughes Aircraft Company, its vendors,
-- and suppliers. ALL RIGHTS RESERVED.
-- /*****
-- **
-- ** BEGIN_PROLOG
-- **
-- ** NAME    MsAgSubAgentMIB.smi
-- **
-- ** DESCRIPTION
-- **        This file contains the SNMP MIB declarations which are used
-- **        by HP-OpenView to access values that are stored on the
-- **        SubAgent side.
-- ** END_PROLOG
-- **
-- *****/
-- */
#include "ode/objids.smi"
#include "ode/types.smi"

APPLICATION_TABLE DEFINITIONS ::= BEGIN

    IMPORTS
        OBJECT-TYPE                FROM RFC-1212
        DisplayString, Enterprise   FROM RFC1213-MIB
        TimeTicks                   FROM RFC1155-SMI;

    application OBJECT IDENTIFIER ::= { enterprises ecs(2000) mss(1) agent(3) 2 }

    -----
    --                               Application static Table
    -----

    appStTable OBJECT-TYPE
        SYNTAX      SEQUENCE OF AppStEntry
        ACCESS      not-accessible
        STATUS      mandatory
        DESCRIPTION
```

"This table contains static information about installed applications. Each application can be identified by its application ID and the mode it's installed under. Hence, if an application is installed under two modes then there will be two entries in the static application table with the ID being the same and the mode different. The data in the static application table doesn't change when an application is started. Updates in the table occur when applications are installed, removed, or upgraded."

::= { application 1 }

```
appStEntry    OBJECT-TYPE
    SYNTAX      AppStEntry
    ACCESS      not-accessible
    STATUS      mandatory
    INDEX       { appStIndex }
               C_NEXT_FUNC "SNMP_GETNEXT_stAppTable"
    ::= { appStTable 1 }
```

```
AppStEntry ::= SEQUENCE
{
    appStID                INTEGER,
    appStMode               DisplayString,
    appStName               DisplayString,
    appStMajorVersion      DisplayString,
    appStMinorVersion      DisplayString,
    appStRevision           DisplayString,
    appStMaintLevel         DisplayString,
    appStInstallTime        DisplayString,
    appStType               DisplayString,
    appStContact            DisplayString,
    appStLanguage           DisplayString,
    appStExecPath           DisplayString,
    appStExecFile           DisplayString,
    appStLogPath            DisplayString,
    appStLogFile            DisplayString,
    appStNumOfProgs         INTEGER,
    appStIndex              INTEGER
}
```

```
appStID       OBJECT-TYPE
    SYNTAX      INTEGER ( 1..4294967296 )
    ACCESS      read-only
               C_TYPE MsAgTeStAppStruct, FIELD nID
               C_LOCATOR_FUNC "SNMP_LOCATE_stAppTable"
    STATUS      mandatory
    DESCRIPTION
        "This attribute represents the application ID of the
```

installed application. A valid value is any positive integer which has not been used by any other installed application. The mode and the ID uniquely identify this application package. For example, if 'Foo' is assigned ID 987 then this attribute stores 987."

::= { appStEntry 1 }

appStMode OBJECT-TYPE

SYNTAX DisplayString (0..8)

ACCESS read-only

C\_TYPE MsAgTeStAppStruct, FIELD dsMode

C\_LOCATOR\_FUNC "SNMP\_LOCATE\_stAppTable"

STATUS mandatory

DESCRIPTION

"This attribute represents the mode of the installed application. A valid value is any nonempty strings which consists of at most 8 alphanumeric characters. The mode and the ID uniquely identify this application package. Examples are TEST or OPS."

::= { appStEntry 2 }

appStName OBJECT-TYPE

SYNTAX DisplayString ( SIZE (0..16) )

ACCESS read-only

C\_TYPE MsAgTeStAppStruct, FIELD dsName

C\_LOCATOR\_FUNC "SNMP\_LOCATE\_stAppTable"

STATUS mandatory

DESCRIPTION

"This attribute contains the name of the installed application. The name may consist of 0 to 16 ascii characters. An example is 'Foo application'."

::= { appStEntry 3 }

appStMajorVersion OBJECT-TYPE

SYNTAX DisplayString ( SIZE (0..16) )

ACCESS read-only

C\_TYPE MsAgTeStAppStruct, FIELD dsMajorVersion

C\_LOCATOR\_FUNC "SNMP\_LOCATE\_stAppTable"

STATUS mandatory

DESCRIPTION

"This attribute stores the major version of the application package. The version consists of 0 to 16 ascii characters. For example, if 'Foo's version were 1.0.71 then the major version might be '1' referring to the number before the first period."

::= { appStEntry 4 }



appStMinorVersion OBJECT-TYPE  
 SYNTAX DisplayString ( SIZE (0..16) )  
 ACCESS read-only  
 C\_TYPE MsAgTeStAppStruct, FIELD dsMinorVersion  
 C\_LOCATOR\_FUNC "SNMP\_LOCATE\_stAppTable"  
 STATUS mandatory  
 DESCRIPTION  
 "This attribute stores the minor version of the  
 application package. The version consists of 0 to  
 16 ascii characters. For example, if 'Foo's  
 version were 1.0.71 then the minor version might  
 be '0' referring to the number between the two  
 periods."  
 ::= { appStEntry 5 }

appStRevision OBJECT-TYPE  
 SYNTAX DisplayString ( SIZE (0..16) )  
 ACCESS read-only  
 C\_TYPE MsAgTeStAppStruct, FIELD dsRevision  
 C\_LOCATOR\_FUNC "SNMP\_LOCATE\_stAppTable"  
 STATUS mandatory  
 DESCRIPTION  
 "This attribute holds the revision level of the  
 application package. A valid value contains 0 to  
 16 ascii characters. For example, if 'Foo's  
 version were 1.0.71 then the minor version might  
 be '71' referring to the number after the second  
 period."  
 ::= { appStEntry 6 }

appStMaintLevel OBJECT-TYPE  
 SYNTAX DisplayString ( SIZE (0..16) )  
 ACCESS read-only  
 C\_TYPE MsAgTeStAppStruct, FIELD dsMaintLevel  
 C\_LOCATOR\_FUNC "SNMP\_LOCATE\_stAppTable"  
 STATUS mandatory  
 DESCRIPTION  
 "This attribute represents the level to which  
 this application has been patched. The level  
 consists of 0 to 16 ascii characters. For  
 example, if 'Foo's maintenance level were  
 1.7.8 then this attribute would store '1.7.8'.  
 ::= { appStEntry 7 }

appStInstallTime OBJECT-TYPE  
 SYNTAX DisplayString ( SIZE (0..16) )  
 ACCESS read-only  
 C\_TYPE MsAgTeStAppStruct, FIELD dsInstallTime

```

                                C_LOCATOR_FUNC "SNMP_LOCATE_stAppTable"
STATUS                          mandatory
DESCRIPTION
    "The install time contains the date and time
    this application was installed. Theoretically,
    this attribute may contain between 0 to 16
    ascii characters. For example, if 'Foo' was
    installed Jan 2nd at 9:30am then this
    attribute might contain '01/02/96 9:30am'."
 ::= { appStEntry 8 }

appStType                       OBJECT-TYPE
SYNTAX                         DisplayString ( SIZE (0..16) )
ACCESS                         read-only
                                C_TYPE MsAgTeStAppStruct, FIELD dsType
                                C_LOCATOR_FUNC "SNMP_LOCATE_stAppTable"
STATUS                         mandatory
DESCRIPTION
    "The attribute holds the type of application
    software. A valid value contains 0 to
    16 ascii characters. For example, if 'Foo'
    is a server application then the type
    would contain the string 'server'."
 ::= { appStEntry 9 }

appStContact OBJECT-TYPE
SYNTAX                         DisplayString ( SIZE (0..16) )
ACCESS                         read-only
                                C_TYPE MsAgTeStAppStruct, FIELD dsContact
                                C_LOCATOR_FUNC "SNMP_LOCATE_stAppTable"
STATUS                         mandatory
DESCRIPTION
    "Contact stores the name of the person or company
    who is responsible for supporting and/or
    maintaining this application. A valid value
    contains 0 to 16 ascii characters. For example,
    if Bill Gates, president of Microsoft personally
    installed application 'Foo' then 'Contact' might
    be 'Bill Gates' or 'Microsoft'."
 ::= { appStEntry 10 }

appStLanguage                   OBJECT-TYPE
SYNTAX                         DisplayString ( SIZE (0..16) )
ACCESS                         read-only
                                C_TYPE MsAgTeStAppStruct, FIELD dsLanguage
                                C_LOCATOR_FUNC "SNMP_LOCATE_stAppTable"
STATUS                         mandatory
DESCRIPTION

```

"This attribute contains the language which enable users to communicate with the software package. The application might support multilingual software and could be installed twice, each with a different application ID and language. A valid value contains between 0 to 16 ascii characters. Examples are English, French, German, Spanish."

::= { appStEntry 11 }

appStExecPath            OBJECT-TYPE  
     SYNTAX                DisplayString ( SIZE (0..64) )  
     ACCESS                read-only  
                           C\_TYPE MsAgTeStAppStruct, FIELD dsPath  
                           C\_LOCATOR\_FUNC "SNMP\_LOCATE\_stAppTable"  
     STATUS                mandatory  
     DESCRIPTION  
         "This attribute stores the complete path (i.e. not relative to the location of the configuration file) of the script which will be used to start the application. A valid value has the following format (up to 64 characters):  
         /usr/ecs/Rel\_A/CUSTOM/bin/(subsystem)/  
         /usr/ecs/Rel\_A/COTS/(cots\_name)/  
         For example, this attribute for custom application 'Foo' would store  
         /usr/ecs/Rel\_A/CUSTOM/bin/FooSubSys/FooMode.  
         And for COTS application 'Foo2' it holds:  
         /usr/ecs/REL\_A/COTS/Foo2/"

::= { appStEntry 12 }

appStExecFile            OBJECT-TYPE  
     SYNTAX                DisplayString ( SIZE (0..16) )  
     ACCESS                read-only  
                           C\_TYPE MsAgTeStAppStruct, FIELD dsFile  
                           C\_LOCATOR\_FUNC "SNMP\_LOCATE\_stAppTable"  
     STATUS                mandatory  
     DESCRIPTION  
         "ExecFile contains the filename of the execution image of the application package. It's the name of the startup script for the application. A valid value is a nonempty string of up to 16 alphanumeric characters. For example, to start application 'Foo' ExecFile would hold the string 'FooStartUpScript'. This script, once invoked, will startup all the programs that belong to this application under the applicable mode."

::= { appStEntry 13 }

appStLogPath OBJECT-TYPE  
 SYNTAX DisplayString ( SIZE (0..64) )  
 ACCESS read-only  
 C\_TYPE MsAgTeStAppStruct, FIELD dsLogPath  
 C\_LOCATOR\_FUNC "SNMP\_LOCATE\_stAppTable"  
 STATUS mandatory  
 DESCRIPTION  
 "This attribute represents the path of the application specific log. A valid value is a nonempty string of at most 64 alphanumeric characters and slashes, i.e. '/'. For example, the log for 'Foo' might be located in directory '/usr/ecs/Rel\_A/CUSTOM/logs/'."  
 ::= { appStEntry 14 }

appStLogFile OBJECT-TYPE  
 SYNTAX DisplayString ( SIZE (0..16) )  
 ACCESS read-only  
 C\_TYPE MsAgTeStAppStruct, FIELD dsLogFile  
 C\_LOCATOR\_FUNC "SNMP\_LOCATE\_stAppTable"  
 STATUS mandatory  
 DESCRIPTION  
 "This attribute contains the filename of the application specific log which ends in '.aCfg'. A valid value is a nonempty string of at most 16 alphanumeric characters. For example, 'Foo's log might be called 'FooLogFile.aCfg'."  
 ::= { appStEntry 15 }

appStNumOfProgs OBJECT-TYPE  
 SYNTAX INTEGER ( 1..4294967296 )  
 ACCESS read-only  
 C\_TYPE MsAgTeStAppStruct, FIELD nNumOfProgs  
 C\_LOCATOR\_FUNC "SNMP\_LOCATE\_stAppTable"  
 STATUS mandatory  
 DESCRIPTION  
 "This attribute stores the number of program that this application contains. A valid value is any positive integer. For example, 'Foo' may have 2 programs. Therefore this attribute would contain the integer 2."  
 ::= { appStEntry 16 }

appStIndex OBJECT-TYPE  
 SYNTAX INTEGER ( 0..4294967296 )  
 ACCESS read-only  
 C\_TYPE MsAgTeStAppStruct, FIELD nIndex  
 C\_LOCATOR\_FUNC "SNMP\_LOCATE\_stAppTable"  
 STATUS mandatory

#### DESCRIPTION

"The attribute holds the SNMP index ID which can be seen in the MIB browser. A valid value is any positive integer. If application 'Foo' is the first application to be discovered by the MSS-SubAgent then 'Foo's SNMP index would be the integer 0."

::= { appStEntry 17 }

-----  
-- Application dynamic Table  
-----

appDyTable OBJECT-TYPE

SYNTAX SEQUENCE OF AppDyEntry

ACCESS not-accessible

STATUS mandatory

#### DESCRIPTION

"This table contains dynamic information about running applications. Each time an application is started the MSS-SubAgent will insert an entry into this table. For example, if application 'Foo' is installed under mode 'OPS' and mode 'TEST', and the HP-OpenView operator starts each of them once then the dynamic application table will hold two entries. NOTE: At this time the parent ID is not used and stores the value minus one."

::= { application 2 }

appDyEntry OBJECT-TYPE

SYNTAX AppDyEntry

ACCESS not-accessible

STATUS mandatory

INDEX { appDyIndex }

C\_NEXT\_FUNC "SNMP\_GETNEXT\_DyAppTable"

::= { appDyTable 1 }

AppDyEntry ::= SEQUENCE

{  
    appDyID INTEGER,  
    appDyMode DisplayString,  
    appDyParentID INTEGER,  
    appDyInstanceID INTEGER,  
    appDyUpTime TimeTicks,  
    appDyIndex INTEGER  
}

appDyID OBJECT-TYPE

SYNTAX INTEGER(1..4294967296)

ACCESS read-only

```

C_TYPE MsAgTeDynamicStruct, FIELD nID
C_LOCATOR_FUNC "SNMP_LOCATE_DyAppTable"
STATUS      mandatory
DESCRIPTION
    "This attribute represents the application ID of the
    running application. A valid value is any positive
    integer which is used by the same application in
    the static application table. The mode and the ID
    uniquely identify this running application. For example,
    if application 'Foo' with application ID 987 is started
    then this ID would contain 987."
::= { appDyEntry 1 }

```

```

appDyMode      OBJECT-TYPE
SYNTAX          DisplayString ( SIZE (0..16) )
ACCESS          read-only
                C_TYPE MsAgTeDynamicStruct, FIELD dsMode
                C_LOCATOR_FUNC "SNMP_LOCATE_DyAppTable"
STATUS          mandatory
DESCRIPTION
    "This attribute represents the mode of the running
    application. A valid value is any nonempty strings
    which consists of at most 8 alphanumeric characters.
    The mode and the ID uniquely identify this running
    application. Examples are TEST or OPS. For example,
    if the HP-OpenView operator starts application 'Foo'
    under mode 'TEST' then this attribute holds TEST."
::= { appDyEntry 2 }

```

```

appDyParentID  OBJECT-TYPE
SYNTAX          INTEGER(1..4294967296)
ACCESS          read-only
                C_TYPE MsAgTeDynamicStruct, FIELD nParentID
                C_LOCATOR_FUNC "SNMP_LOCATE_DyAppTable"
STATUS          mandatory
DESCRIPTION
    "This attribute is not used at the presents time.
    For the ease of coding it represents the ID of the
    parent of the running application. Its default
    value is -1."
::= { appDyEntry 3 }

```

```

appDyInstanceID OBJECT-TYPE
SYNTAX          INTEGER(0..4294967296)
ACCESS          read-only
                C_TYPE MsAgTeDynamicStruct, FIELD nInstanceId
                C_LOCATOR_FUNC "SNMP_LOCATE_DyAppTable"
STATUS          mandatory

```

#### DESCRIPTION

"This attribute holds the instance ID of this application. The MSS-SubAgent assigns an instance ID to each running application and program. This ID is used to distinguish between applications and programs which are running multiple times. If application 'Foo\_OPS' is the first one to be started then its Instance ID is zero. If one starts it again then the second instance would hold an integer bigger than zero (depending on how many applications are started between Foo\_OPS1 and Foo\_OPS2)."

::= { appDyEntry 4 }

appDyUpTime OBJECT-TYPE

SYNTAX TimeTicks

ACCESS read-only

C\_TYPE MsAgTeDynamicStruct, FIELD ttUpTime

C\_LOCATOR\_FUNC "SNMP\_LOCATE\_DyAppTable"

STATUS mandatory

#### DESCRIPTION

"UpTime stores the number of milliseconds this application has been running. That is, the time between now and when the MSS-SubAgent received the 'startup' command. A valid value is any positive integer which increases by 1 every millisecond."

::= { appDyEntry 5 }

appDyIndex OBJECT-TYPE

SYNTAX INTEGER ( 0..4294967296 )

ACCESS read-only

C\_TYPE MsAgTeDynamicStruct, FIELD nIndex

C\_LOCATOR\_FUNC "SNMP\_LOCATE\_DyAppTable"

STATUS mandatory

#### DESCRIPTION

"The attribute holds the SNMP index ID which can be seen in the MIB browser. A valid value is any positive integer. If application 'Foo' is the first application to be started by the MSS-SubAgent then 'Foo's SNMP index for this instance would be the integer 0."

::= { appDyEntry 6 }

-----  
-- Application Performance Metric Table  
-----

appPerfTable OBJECT-TYPE

SYNTAX SEQUENCE OF AppPerfEntry

ACCESS not-accessible

STATUS mandatory  
DESCRIPTION  
"This table contains application specific performance metrics which consist of the various types and values of the application specific performances."  
::= { application 3 }

appPerfEntry OBJECT-TYPE  
SYNTAX AppPerfEntry  
ACCESS not-accessible  
STATUS mandatory  
INDEX { appPerfIndex }  
C\_NEXT\_FUNC "SNMP\_GETNEXT\_stAppPerfTable"  
::= { appPerfTable 1 }

AppPerfEntry ::= SEQUENCE  
{  
appPerfID INTEGER,  
appPerfInstanceID INTEGER,  
appPerfType DisplayString,  
appPerfValue INTEGER,  
appPerfFaultThreshold INTEGER,  
appPerfRearmFaultThd INTEGER,  
appPerfMaxThreshold INTEGER,  
appPerfRearmMaxThd INTEGER,  
appPerfMinThreshold INTEGER,  
appPerfRearmMinThd INTEGER,  
appPerfIndex INTEGER  
}

appPerfID OBJECT-TYPE  
SYNTAX INTEGER ( 1..4294967296 )  
ACCESS read-only  
C\_TYPE MsAgTePerfStruct, FIELD nID  
C\_LOCATOR\_FUNC "SNMP\_LOCATE\_stAppPerfTable"  
STATUS mandatory  
DESCRIPTION  
"This attribute represents the application ID of the running application which registered this performance metric with the MSS-SubAgent. A valid value is any positive integer which has an entry in the static application table. The mode and the ID uniquely identify this application. For example, if 'Foo' is assigned ID 987 then this attribute stores 987."  
::= { appPerfEntry 1 }

appPerfInstanceID OBJECT-TYPE  
SYNTAX INTEGER ( 1..4294967296 )



```

ACCESS      read-only
            C_TYPE MsAgTePerfStruct, FIELD nInstanceID
            C_LOCATOR_FUNC "SNMP_LOCATE_stAppPerfTable"
STATUS      mandatory
DESCRIPTION
    "This attribute holds the instance ID of this application.
    The MSS-SubAgent assigns an instance ID to each running
    application and program. This ID is used to distinguish
    between applications and programs which are running
    multiple times. If application 'Foo_OPS' is the first one
    to be started then its Instance ID is zero. If one starts
    it again then the second instance would hold an integer
    bigger than zero (depending on how many applications are
    started between Foo_OPS1 and Foo_OPS2)."
```

::= { appPerfEntry 2 }

```

appPerfType OBJECT-TYPE
SYNTAX      DisplayString ( SIZE (1..25))
ACCESS      read-only
            C_TYPE MsAgTePerfStruct, FIELD dsType
            C_LOCATOR_FUNC "SNMP_LOCATE_stAppPerfTable"
STATUS      mandatory
DESCRIPTION
    "The attribute stores the type of performance metric which
    is being tracked at the application level. A valid value
    is any nonempty string of up to 25 characters. An example
    is metric type 'number of windows open'."
```

::= { appPerfEntry 3 }

```

appPerfValue OBJECT-TYPE
SYNTAX      INTEGER ( 0..4294967296 )
ACCESS      read-only
            C_TYPE MsAgTePerfStruct, FIELD nValue
            C_LOCATOR_FUNC "SNMP_LOCATE_stAppPerfTable"
STATUS      mandatory
DESCRIPTION
    "This attribute tracks the current value of this performace
    metric. A valid value is a non-negative integer. In the
    'number of windows open' example, the value attribute tracks
    the number of windows open which might be 12."
```

::= { appPerfEntry 4 }

```

appPerfFaultThreshold OBJECT-TYPE
SYNTAX      INTEGER ( 0..4294967296 )
ACCESS      read-only
            C_TYPE MsAgTePerfStruct, FIELD nFaultThreshold
            C_LOCATOR_FUNC "SNMP_LOCATE_stAppPerfTable"
STATUS      mandatory
```

#### DESCRIPTION

"This attribute determines when the threshold value becomes a fault. When the current value exceeds the fault threshold value then the MSS-SubAgent will generate an event. The following line illustrates the relation among the various threshold values:

$\text{min} < \text{minRearm} < \text{maxRearm} < \text{max} < \text{faultRearm} < \text{fault}.$

For example, if the fault threshold is 10 and the current value is 12 then the MSS-SubAgent will take some action."

::= { appPerfEntry 5 }

appPerfRearmFaultThd OBJECT-TYPE

SYNTAX INTEGER ( 0..4294967296 )

ACCESS read-only

C\_TYPE MsAgTePerfStruct, FIELD nRearmFaultThreshold

C\_LOCATOR\_FUNC "SNMP\_LOCATE\_stAppPerfTable"

STATUS mandatory

#### DESCRIPTION

"This attribute stores the rearm fault value. A valid value for this threshold is any integer smaller than the fault threshold value for this performance metric. The following line illustrates the relation among the various threshold values:

$\text{min} < \text{minRearm} < \text{maxRearm} < \text{max} < \text{faultRearm} < \text{fault}.$

The following example illustrates the need for the rearm value:

If the fault threshold is 10 and the current value changes back and forth from 9 to 11 then the MSS-SubAgent shouldn't take an action each time the fault threshold is exceeded.

If the rearm fault value is 8 then in the above scenario the MSS-SubAgent would create one event because the current value exceeded the fault threshold for the first time. But as long as the current value remains above 8 then no action is taken by the MSS-SubAgent. But as soon as the current value changes to 7 and then exceeds 10 another event is created by the MSS-SubAgent."

::= { appPerfEntry 6 }

appPerfMaxThreshold OBJECT-TYPE

SYNTAX INTEGER ( 0..4294967296 )

ACCESS read-only

C\_TYPE MsAgTePerfStruct, FIELD nMaxThreshold

C\_LOCATOR\_FUNC "SNMP\_LOCATE\_stAppPerfTable"

STATUS mandatory

#### DESCRIPTION

"This attribute determines when the threshold value exceeds the maximum value. When the current value exceeds the maximum threshold value then the MSS-SubAgent will generate an event. For example, if the maximum threshold is 10 and the

current value is 12 then the MSS-SubAgent will take some action.  
The following line illustrates the relation among the various  
threshold values:

$\text{min} < \text{minRearm} < \text{maxRearm} < \text{max} < \text{faultRearm} < \text{fault}.$ "

::= { appPerfEntry 7 }

appPerfRearmMaxThd OBJECT-TYPE

SYNTAX INTEGER ( 0..4294967296 )

ACCESS read-only

C\_TYPE MsAgTePerfStruct, FIELD nRearmMaxThreshold

C\_LOCATOR\_FUNC "SNMP\_LOCATE\_stAppPerfTable"

STATUS mandatory

DESCRIPTION

"This attribute stores the rearm max value. A valid value  
for this threshold is any integer smaller than the max  
threshold value for this performance metric. The following  
line illustrates the relation among the various threshold  
values:

$\text{min} < \text{minRearm} < \text{maxRearm} < \text{max} < \text{faultRearm} < \text{fault}.$

The following example illustrates the need for the rearm value:

If the max threshold is 10 and the current value changes  
back and forth from 9 to 11 then the MSS-SubAgent shouldn't  
take an action each time the max threshold is exceeded.

If the rearm max value is 8 then in the above scenario  
the MSS-SubAgent would create one event because the current  
value exceeded the max threshold for the first time. But  
as long as the current value remains above 8 then no action  
is taken by the MSS-SubAgent (unless the fault threshold value  
is exceeded). But as soon as the current value changes to 7  
and then exceeds 10 another event is created by the  
MSS-SubAgent."

::= { appPerfEntry 8 }

appPerfMinThreshold OBJECT-TYPE

SYNTAX INTEGER ( 0..4294967296 )

ACCESS read-only

C\_TYPE MsAgTePerfStruct, FIELD nMinThreshold

C\_LOCATOR\_FUNC "SNMP\_LOCATE\_stAppPerfTable"

STATUS mandatory

DESCRIPTION

"This attribute determines when the threshold value is lower than  
the minimum value. When the current value is lower than the  
minimum threshold value then the MSS-SubAgent will generate  
an event. For example, if the minimum threshold is 10 and the  
current value is 8 then the MSS-SubAgent will take some action.  
The following line illustrates the relation among the various  
threshold values:

$\text{min} < \text{minRearm} < \text{maxRearm} < \text{max} < \text{faultRearm} < \text{fault}.$ "

```
::= { appPerfEntry 9 }
```

```
appPerfRearmMinThd      OBJECT-TYPE
    SYNTAX      INTEGER ( 1..4294967296 )
    ACCESS      read-only
    C_TYPE      MsAgTePerfStruct, FIELD nRearmMinThreshold
    C_LOCATOR_FUNC "SNMP_LOCATE_stAppPerfTable"
    STATUS      mandatory
    DESCRIPTION
        "This attribute stores the rearm min value. A valid value
        for this threshold is any integer bigger than the min
        threshold value for this performance metric. The following
        line illustrates the relation among the various threshold
        values:
        min < minRearm < maxRearm < max < faultRearm < fault.
        The following example illustrates the need for the rearm value:
        If the min threshold is 10 and the current value changes
        back and forth from 9 to 11 then the MSS-SubAgent shouldn't
        take an action each time the value is less than the min
        threshold value. If the rearm min value is 12 then in the
        above scenario the MSS-SubAgent would create one event because
        the current value is lower than the min threshold for the first
        time. But as long as the current value remains below 12 then no
        action is taken by the MSS-SubAgent. But as soon as the current
        value changes to 13 and then to 7 another event is created by the
        MSS-SubAgent."
```

```
::= { appPerfEntry 10 }
```

```
appPerfIndex OBJECT-TYPE
    SYNTAX      INTEGER ( 1..4294967296 )
    ACCESS      read-only
    C_TYPE      MsAgTePerfStruct, FIELD nIndex
    C_LOCATOR_FUNC "SNMP_LOCATE_stAppPerfTable"
    STATUS      mandatory
    DESCRIPTION
        "The attribute holds the SNMP index ID which can
        be seen in the MIB browser. A valid value is any
        positive integer. If application 'Foo' is the first
        application to be started by the MSS-SubAgent then
        'Foo's SNMP index for this instance would be the
        integer 0."
```

```
::= { appPerfEntry 11 }
```

```
-----
--      Application Fault Metric Table
-----
```

```

appFaultTable      OBJECT-TYPE
    SYNTAX          SEQUENCE OF AppFaultEntry
    ACCESS           not-accessible
    STATUS           mandatory
    DESCRIPTION
        "This table contains application specific fault
        metrics which consist of the various types and values
        of the application specific fault. The type is any string
        and the value is a counter of the specified fault type."
    ::= { application 4 }

appFaultEntry      OBJECT-TYPE
    SYNTAX          AppFaultEntry
    ACCESS           not-accessible
    STATUS           mandatory
    INDEX           { appFaultIndex }
        C_NEXT_FUNC "SNMP_GETNEXT_stAppFaultTable"
    ::= { appFaultTable 1 }

```

```

AppFaultEntry ::= SEQUENCE
{
    appFaultID          INTEGER,
    appFaultInstanceID  INTEGER,
    appFaultType        DisplayString,
    appFaultValue        INTEGER,
    appFaultIndex        INTEGER
}

```

```

appFaultID  OBJECT-TYPE
    SYNTAX   INTEGER ( 1..4294967296 )
    ACCESS   read-only
        C_TYPE MsAgTeFaultStruct,          FIELD nID
        C_LOCATOR_FUNC "SNMP_LOCATE_stAppFaultTable"
    STATUS   mandatory
    DESCRIPTION
        "This attribute represents the application ID of the
        running application which registered this performance
        metric with the MSS-SubAgent. A valid value is any
        positive integer which has an entry in the static
        application table. The mode and the ID uniquely identify
        this running application. For example, if 'Foo' is
        assigned ID 987 then this attribute stores 987."
    ::= { appFaultEntry 1 }

```

```

appFaultInstanceID OBJECT-TYPE
    SYNTAX   INTEGER ( 1..4294967296 )
    ACCESS   read-only
        C_TYPE MsAgTeFaultStruct,          FIELD nInstanceID

```

```

        C_LOCATOR_FUNC      "SNMP_LOCATE_stAppFaultTable"
STATUS      mandatory
DESCRIPTION
    "This attribute holds the instance ID of this application.
    The MSS-SubAgent assigns an instance ID to each running
    application and program. This ID is used to distinguish
    between applications and programs which are running
    multiple times. If application 'Foo_OPS' is the first one
    to be started then its Instance ID is zero. If one starts
    it again then the second instance would hold an integer
    bigger than zero (depending on how many applications are
    started between Foo_OPS1 and Foo_OPS2)."
::= { appFaultEntry 2 }

appFaultType OBJECT-TYPE
SYNTAX      DisplayString ( SIZE ( 0..25))
ACCESS      read-only
        C_TYPE MsAgTeFaultStruct,      FIELD dsType
        C_LOCATOR_FUNC      "SNMP_LOCATE_stAppFaultTable"
STATUS      mandatory
DESCRIPTION
    "The attribute stores the type of fault metric which
    is being tracked at the application level. A valid value
    is any nonempty string of up to 25 characters. An example
    is metric type '# Sybase access failures'."
::= { appFaultEntry 3 }

appFaultValue      OBJECT-TYPE
SYNTAX      INTEGER ( 1..4294967296 )
ACCESS      read-only
        C_TYPE MsAgTeFaultStruct,      FIELD nValue
        C_LOCATOR_FUNC      "SNMP_LOCATE_stAppFaultTable"
STATUS      mandatory
DESCRIPTION
    "This attribute tracks the current value of this fault
    metric. A valid value is a non-negative integer. In the
    '# Sybase access failures' example, the value attribute tracks
    the number of failures to access Sybase which might be 12."
::= { appFaultEntry 4 }

appFaultIndex OBJECT-TYPE
SYNTAX      INTEGER ( 1..4294967296 )
ACCESS      read-only
        C_TYPE MsAgTeFaultStruct, FIELD nIndex
        C_LOCATOR_FUNC "SNMP_LOCATE_stAppFaultTable"
STATUS      mandatory
DESCRIPTION
    "The attribute holds the SNMP index ID which can

```

be seen in the MIB browser. A valid value is any positive integer. If application 'Foo' is the first application to be started by the MSS-SubAgent then 'Foo's SNMP index for this instance would be the integer 0."

::= { appFaultEntry 5 }

-----  
 -- Application Configuration Metric table  
 -----

appCfgTable OBJECT-TYPE  
 SYNTAX SEQUENCE OF AppCfgEntry  
 ACCESS not-accessible  
 STATUS mandatory  
 DESCRIPTION  
 "This table contains application specific configuration metrics which consist of the various types and values of the application specific configurations. The type is any string and the value is the corresponding string."

::= { application 5 }

appCfgEntry OBJECT-TYPE  
 SYNTAX AppCfgEntry  
 ACCESS not-accessible  
 STATUS mandatory  
 INDEX { appCfgIndex }  
 C\_NEXT\_FUNC "SNMP\_GETNEXT\_stAppCfgTable"  
 ::= { appCfgTable 1 }

AppCfgEntry ::= SEQUENCE  
 {  
 appCfgID INTEGER,  
 appInstanceID INTEGER,  
 appCfgType DisplayString,  
 appCfgValue DisplayString,  
 appCfgIndex INTEGER  
 }

appCfgID OBJECT-TYPE  
 SYNTAX INTEGER (1..4294967296)  
 ACCESS read-only  
 C\_TYPE MsAgTeConfigStruct, FIELD nID  
 C\_LOCATOR\_FUNC "SNMP\_LOCATE\_stAppCfgTable"  
 STATUS mandatory  
 DESCRIPTION  
 "This attribute represents the application ID of the running application which registered this performance

metric with the MSS-SubAgent. A valid value is any positive integer which has an entry in the static application table. The mode and the ID uniquely identify this running application. For example, if 'Foo' is assigned ID 987 then this attribute stores 987."

::= { appCfgEntry 1 }

appInstanceID OBJECT-TYPE  
 SYNTAX INTEGER (1..4294967296)  
 ACCESS read-only  
 C\_TYPE MsAgTeConfigStruct, FIELD nInstanceID  
 C\_LOCATOR\_FUNC "SNMP\_LOCATE\_stAppCfgTable"  
 STATUS mandatory  
 DESCRIPTION  
 "This attribute holds the instance ID of this application. The MSS-SubAgent assigns an instance ID to each running application and program. This ID is used to distinguish between applications and programs which are running multiple times. If application 'Foo\_OPS' is the first one to be started then its Instance ID is zero. If one starts it again then the second instance would hold an integer bigger than zero (depending on how many applications are started between Foo\_OPS1 and Foo\_OPS2)."  
 ::= { appCfgEntry 2 }

appCfgType OBJECT-TYPE  
 SYNTAX DisplayString (SIZE(0..25))  
 ACCESS read-only  
 C\_TYPE MsAgTeConfigStruct, FIELD dsType  
 C\_LOCATOR\_FUNC "SNMP\_LOCATE\_stAppCfgTable"  
 STATUS mandatory  
 DESCRIPTION  
 "This attribute stores the type of configuration metric which is being tracked at the application level. A valid value is any nonempty string of up to 25 characters. An example is metric type 'event level', a value that might tell the MSS-SubAgent when to log an event to the application log file."  
 ::= { appCfgEntry 3 }

appCfgValue OBJECT-TYPE  
 SYNTAX DisplayString (SIZE(0..25))  
 ACCESS read-only  
 C\_TYPE MsAgTeConfigStruct, FIELD dsValue  
 C\_LOCATOR\_FUNC "SNMP\_LOCATE\_stAppCfgTable"  
 STATUS mandatory  
 DESCRIPTION  
 "This attribute tracks the current value of this configuration



metric. A valid value is a non-negative integer. In the 'event level' example, the value attribute tracks the level of when to log to the application log file which might be 5."

::= { appCfgEntry 4 }

appCfgIndex OBJECT-TYPE

SYNTAX INTEGER ( 1..4294967296 )

ACCESS read-only

C\_TYPE MsAgTeConfigStruct, FIELD nIndex

C\_LOCATOR\_FUNC "SNMP\_LOCATE\_stAppCfgTable"

STATUS mandatory

DESCRIPTION

"The attribute holds the SNMP index ID which can be seen in the MIB browser. A valid value is any positive integer. If application 'Foo' is the first application to be started by the MSS-SubAgent then 'Foo's SNMP index for this instance would be the integer 0."

::= { appCfgEntry 5 }

END

PROGRAM\_TABLE DEFINITIONS ::= BEGIN

IMPORTS

OBJECT-TYPE FROM RFC-1212

DisplayString, Enterprise FROM RFC1213-MIB

TimeTicks FROM RFC1155-SMI;

program OBJECT IDENTIFIER ::= { enterprises ecs(2000) mss(1) agent(3) 3 }

```
-----
--          Program static table
-----
```

progStTable OBJECT-TYPE

SYNTAX SEQUENCE OF ProgStEntry

ACCESS not-accessible

STATUS mandatory

DESCRIPTION

"This table contains static information about installed programs. Each program can be identified by its program ID and the mode it's installed under. Hence, if a program is installed under two modes then there will be two entries in the static program table with the ID being the same and the mode different. The data in the static program table doesn't change when a program is started. Updates in the table

occur when programs are installed, removed, or upgraded."  
 ::= { program 1 }

```

progStEntry OBJECT-TYPE
    SYNTAX      ProgStEntry
    ACCESS      not-accessible
    STATUS      mandatory
    INDEX       { progStIndex }
    C_NEXT_FUNC "SNMP_GETNEXT_stProgTable"
  ::= { progStTable 1 }

```

```

ProgStEntry ::= SEQUENCE
{
    progStID          INTEGER,
    progStMode        DisplayString,
    progStName        DisplayString,
    progStAppID       INTEGER,
    progStMajorVersion DisplayString,
    progStMinorVersion DisplayString,
    progStRevision    DisplayString,
    progStMaintLevel  DisplayString,
    progStInstallTime DisplayString,
    progStType        DisplayString,
    progStContact     DisplayString,
    progStExecPath    DisplayString,
    progStExecFile    DisplayString,
    progStTimeOut     INTEGER,
    progStIndex       INTEGER
}

```

```

progStID OBJECT-TYPE
    SYNTAX      INTEGER ( 1..4294967296 )
    ACCESS      read-only
    C_TYPE      MsAgTeStProgStruct, FIELD nID
    C_LOCATOR_FUNC "SNMP_LOCATE_stProgTable"
    STATUS      mandatory
    DESCRIPTION
        "This attribute represents the program ID of the
        installed program. A valid value is any positive
        integer which has not been used by any other installed
        program. The mode and the ID uniquely identify
        this program. For example, if 'FooProg' is assigned ID 9876
        then this attribute stores 9876."
  ::= { progStEntry 1 }

```

```

progStMode OBJECT-TYPE
    SYNTAX      DisplayString (0..8)
    ACCESS      read-only

```

```

        C_TYPE MsAgTeStProgStruct, FIELD dsMode
        C_LOCATOR_FUNC "SNMP_LOCATE_stProgTable"
STATUS          mandatory
DESCRIPTION
    "This attribute represents the mode of the installed
    program. A valid value is any nonempty strings
    which consists of at most 8 alphanumeric characters.
    The mode and the ID uniquely identify this
    program. Examples are TEST or OPS. If a program is
    installed under a certain mode then there needs to be
    an application (the program's parent) which is installed
    under the same mode.)"
::= { progStEntry 2 }

progStName OBJECT-TYPE
SYNTAX          DisplayString ( SIZE (0..16) )
ACCESS          read-only
                C_TYPE MsAgTeStProgStruct, FIELD dsName
                C_LOCATOR_FUNC "SNMP_LOCATE_stProgTable"
STATUS          mandatory
DESCRIPTION
    "This attribute contains the name of the installed
    program. The name may consist of 0 to 16
    ascii characters. An example is 'Foo program'."
::= { progStEntry 3 }

progStAppID OBJECT-TYPE
SYNTAX          INTEGER (1..4294967296)
ACCESS          read-only
                C_TYPE MsAgTeStProgStruct, FIELD nParentID
                C_LOCATOR_FUNC "SNMP_LOCATE_stProgTable"
STATUS          mandatory
DESCRIPTION
    "This attribute represents the application ID of the
    installed program. A valid value is any positive
    integer which has not been used by any other installed
    application. For example, if application 'Foo' (ID 987)
    contains program 'FooProg' (ID 9876) then this attribute
    stores 987, the ID of the application. The ID which
    refers to the application this program belongs to."
::= { progStEntry 4 }

progStMajorVersion OBJECT-TYPE
SYNTAX          DisplayString ( SIZE (0..16) )
ACCESS          read-only
                C_TYPE MsAgTeStProgStruct, FIELD dsMajorVersion
                C_LOCATOR_FUNC "SNMP_LOCATE_stProgTable"
STATUS          mandatory

```

#### DESCRIPTION

"This attribute stores the major version of the installed program. The version consists of 0 to 16 ascii characters. For example, if 'FooProg's version were 1.0.71 then the major version might be '1' referring to the number before the first period."

::= { progStEntry 5 }

progStMinorVersion OBJECT-TYPE

SYNTAX DisplayString ( SIZE (0..16) )

ACCESS read-only

C\_TYPE MsAgTeStProgStruct, FIELD dsMinorVersion

C\_LOCATOR\_FUNC "SNMP\_LOCATE\_stProgTable"

STATUS mandatory

#### DESCRIPTION

"This attribute stores the minor version of the installed program. The version consists of 0 to 16 ascii characters. For example, if 'FooProg's version were 1.0.71 then the minor version might be '0' referring to the number between the two periods."

::= { progStEntry 6 }

progStRevision OBJECT-TYPE

SYNTAX DisplayString ( SIZE (0..16) )

ACCESS read-only

C\_TYPE MsAgTeStProgStruct, FIELD dsRevision

C\_LOCATOR\_FUNC "SNMP\_LOCATE\_stProgTable"

STATUS mandatory

#### DESCRIPTION

"This attribute holds the revision level of the installed program. A valid value contains 0 to 16 ascii characters. For example, if 'FooProg's version were 1.0.71 then the minor version might be '71' referring to the number after the second period."

::= { progStEntry 7 }

progStMaintLevel OBJECT-TYPE

SYNTAX DisplayString ( SIZE (0..16) )

ACCESS read-only

C\_TYPE MsAgTeStProgStruct, FIELD dsMaintLevel

C\_LOCATOR\_FUNC "SNMP\_LOCATE\_stProgTable"

STATUS mandatory

#### DESCRIPTION

"This attribute represents the level to which this program has been patched. The level

consists of 0 to 16 ascii characters. For example, if 'FooProg's maintenance level were 1.7.8 then this attribute would store '1.7.8'."

```
::= { progStEntry 8 }
```

#### progStInstallTime OBJECT-TYPE

```
SYNTAX      DisplayString ( SIZE (0..16) )
ACCESS      read-only
             C_TYPE MsAgTeStProgStruct, FIELD dsInstallTime
             C_LOCATOR_FUNC "SNMP_LOCATE_stProgTable"

STATUS      mandatory

DESCRIPTION
    "The install time contains the date and time
    this program was installed. Theoretically,
    this attribute may contain between 0 to 16
    ascii characters. For example, if 'FooProg' was
    installed Jan 2nd at 9:30am then this
    attribute might contain '01/02/96 9:30am'."

::= { progStEntry 9 }
```

#### progStType OBJECT-TYPE

```
SYNTAX      DisplayString ( SIZE(0..16))
ACCESS      read-only
             C_TYPE MsAgTeStProgStruct, FIELD dsType
             C_LOCATOR_FUNC "SNMP_LOCATE_stProgTable"

STATUS      mandatory

DESCRIPTION
    "The attribute holds the type of program
    software. A valid value contains 0 to
    16 ascii characters. For example, if 'FooProg'
    is a server program then the type
    would contain the string 'server'."

::= { progStEntry 10 }
```

#### progStContact OBJECT-TYPE

```
SYNTAX      DisplayString ( SIZE (0..16) )
ACCESS      read-only
             C_TYPE MsAgTeStProgStruct, FIELD dsContact
             C_LOCATOR_FUNC "SNMP_LOCATE_stProgTable"

STATUS      mandatory

DESCRIPTION
    "Contact stores the name of the person or company
    who is responsible for supporting and/or
    maintaining this program. A valid value
    contains 0 to 16 ascii characters. For example,
    if Bill Gates, president of Microsoft personally
    installed program 'FooProg' then 'Contact' might
    be 'Bill Gates' or 'Microsoft'."
```

::= { progStEntry 11 }

progStExecPath        OBJECT-TYPE  
    SYNTAX            DisplayString ( SIZE (0..64) )  
    ACCESS            read-only  
                      C\_TYPE MsAgTeStProgStruct, FIELD dsPath  
                      C\_LOCATOR\_FUNC "SNMP\_LOCATE\_stProgTable"  
    STATUS            mandatory  
    DESCRIPTION  
        "This attribute stores the complete path (i.e.  
        not relative to the location of the configuration  
        file) of the script/executable which will be used  
        to start the program. A valid value has the following  
        format (up to 64 characters):  
        /usr/ecs/Rel\_A/CUSTOM/bin/(subsystem)/  
        /usr/ecs/Rel\_A/COTS/(cots\_name)/  
        For example, this attribute for custom program  
        'FooProg' would store  
        /usr/ecs/Rel\_A/CUSTOM/bin/FooSubSys/FooMode.  
        And for COTS program 'Foo2Prog' it holds:  
        /usr/ecs/REL\_A/COTS/Foo2Prog/"

::= { progStEntry 12 }

progStExecFile        OBJECT-TYPE  
    SYNTAX            DisplayString ( SIZE (0..16) )  
    ACCESS            read-only  
                      C\_TYPE MsAgTeStProgStruct, FIELD dsFile  
                      C\_LOCATOR\_FUNC "SNMP\_LOCATE\_stProgTable"  
    STATUS            mandatory  
    DESCRIPTION  
        "ExecFile contains the filename of the execution  
        image of the program. It's the name of the startup  
        script/executable for the program. A valid value  
        is a nonempty string of up to 16 alphanumeric characters.  
        For example, to start program 'FooProg' ExecFile would  
        hold the string 'FooProgExecName'."

::= { progStEntry 13 }

progStTimeOut         OBJECT-TYPE  
    SYNTAX            INTEGER (1..4294967296)  
    ACCESS            read-only  
                      C\_TYPE MsAgTeStProgStruct, FIELD nTimeOut  
                      C\_LOCATOR\_FUNC "SNMP\_LOCATE\_stProgTable"  
    STATUS            mandatory  
    DESCRIPTION  
        "This attribute stores the timeout value. A valid value  
        is any positive integer. The purpose of this attribute

is to shutdown the program after the predefined number  
of seconds are exceeded."  
::= { progStEntry 14 }

progStIndex OBJECT-TYPE  
SYNTAX INTEGER (1..4294967296)  
ACCESS read-only  
C\_TYPE MsAgTeStProgStruct, FIELD nIndex  
C\_LOCATOR\_FUNC "SNMP\_LOCATE\_stProgTable"  
STATUS mandatory  
DESCRIPTION  
"The attribute holds the SNMP index ID which can  
be seen in the MIB browser. A valid value is any  
positive integer. If program 'FooProg' is the first  
program to be discovered by the MSS-SubAgent then  
'Foo's SNMP index would be the integer 0."  
::= { progStEntry 15 }

-----  
-- Program dynamic table  
-----

progDyTable OBJECT-TYPE  
SYNTAX SEQUENCE OF ProgDyEntry  
ACCESS not-accessible  
STATUS mandatory  
DESCRIPTION  
"This table contains dynamic information about running  
programs. Each time a program is started the MSS-SubAgent  
will insert an entry into this table. For example,  
if program 'FooProg' is installed under mode 'OPS' and mode  
'TEST', and the HP-OpenView operator starts each of them once  
then the dynamic program table will hold two entries."  
::= { program 2 }

progDyEntry OBJECT-TYPE  
SYNTAX ProgDyEntry  
ACCESS not-accessible  
STATUS mandatory  
INDEX { progDyIndex }  
C\_NEXT\_FUNC "SNMP\_GETNEXT\_ProgDyTable"  
::= { progDyTable 1 }

ProgDyEntry ::= SEQUENCE  
{  
progDyID INTEGER,  
progDyMode DisplayString,

```

        progDyParentID          INTEGER,
        progDyInstanceID       INTEGER,
        progDyUpTime           TimeTicks,
        progDyIndex            INTEGER
    }

progDyID OBJECT-TYPE
    SYNTAX          INTEGER ( 1..4294967296 )
    ACCESS          read-only
                   C_TYPE MsAgTeDynamicStruct, FIELD nID
                   C_LOCATOR_FUNC "SNMP_LOCATE_ProgDyTable"
    STATUS          mandatory
    DESCRIPTION
        "This attribute represents the program ID of the
        running program. A valid value is any positive
        integer which is used by the same program in
        the static program table. The mode and the ID
        uniquely identify this running program. For example,
        if program 'FooProg' with program ID 9876 is started
        then this ID would contain 9876."
    ::= { progDyEntry 1 }

progDyMode OBJECT-TYPE
    SYNTAX          DisplayString (0..8)
    ACCESS          read-only
                   C_TYPE MsAgTeDynamicStruct, FIELD dsMode
                   C_LOCATOR_FUNC "SNMP_LOCATE_ProgDyTable"
    STATUS          mandatory
    DESCRIPTION
        "This attribute represents the mode of the running
        program. A valid value is any nonempty strings
        which consists of at most 8 alphanumeric characters.
        The mode and the ID uniquely identify this running
        program. Examples are TEST or OPS. For example,
        if the HP-OpenView operator starts program 'FooProg'
        under mode 'TEST' then this attribute holds TEST."
    ::= { progDyEntry 2 }

progDyParentID OBJECT-TYPE
    SYNTAX          INTEGER ( 1..4294967296 )
    ACCESS          read-only
                   C_TYPE MsAgTeDynamicStruct, FIELD nParentID
                   C_LOCATOR_FUNC "SNMP_LOCATE_ProgDyTable"
    STATUS          mandatory
    DESCRIPTION
        "This attribute contains the parent ID of this program
        which holds the ID of the application this program
        belongs to. A valid value is any positive integer."

```



::= { progDyEntry 3 }

progDyInstanceId     OBJECT-TYPE  
    SYNTAX            INTEGER ( 1..4294967296 )  
    ACCESS            read-only  
                      C\_TYPE MsAgTeDynamicStruct, FIELD nInstanceId  
                      C\_LOCATOR\_FUNC "SNMP\_LOCATE\_ProgDyTable"  
    STATUS            mandatory  
    DESCRIPTION  
        "This attribute holds the instance ID of this program.  
        The MSS-SubAgent assigns an instance ID to each running  
        application and program. This ID is used to distinguish  
        between applications and programs which are running  
        multiple times. If program 'FooProg\_OPS' is the first one  
        to be started then its Instance ID is zero. If one starts  
        it again then the second instance would hold an integer  
        bigger than zero (depending on how many applications are  
        started between FooProg\_OPS1 and FooProg\_OPS2)."  
::= { progDyEntry 4 }

progDyUpTime        OBJECT-TYPE  
    SYNTAX            TimeTicks  
    ACCESS            read-only  
                      C\_TYPE MsAgTeDynamicStruct, FIELD ttUpTime  
                      C\_LOCATOR\_FUNC "SNMP\_LOCATE\_ProgDyTable"  
    STATUS            mandatory  
    DESCRIPTION  
        "UpTime stores the number of milliseconds this program  
        has been running. That is, the time between now and when  
        the MSS-SubAgent received the 'startup' command. A valid  
        value is any positive integer which increases by 1 every  
        millisecond."  
::= { progDyEntry 5 }

progDyIndex        OBJECT-TYPE  
    SYNTAX            INTEGER ( 1..4294967296 )  
    ACCESS            read-only  
                      C\_TYPE MsAgTeDynamicStruct, FIELD nIndex  
                      C\_LOCATOR\_FUNC "SNMP\_LOCATE\_ProgDyTable"  
    STATUS            mandatory  
    DESCRIPTION  
        "The attribute holds the SNMP index ID which can  
        be seen in the MIB browser. A valid value is any  
        positive integer. If application 'Foo' is the first  
        application to be started by the MSS-SubAgent then  
        'Foo's SNMP index for this instance would be the  
        integer 0."  
::= { progDyEntry 6 }

---

--                    Program Fault Metric Table

---

```

progFaultTable        OBJECT-TYPE
    SYNTAX            SEQUENCE OF ProgFaultEntry
    ACCESS            not-accessible
    STATUS            mandatory
    DESCRIPTION
        "This table contains program specific fault metrics which
         consist of the various types and values of the program specific
         fault. The type is any string and the value is a counter of the
         specified fault type."
    ::= { program 3 }

progFaultEntry        OBJECT-TYPE
    SYNTAX            ProgFaultEntry
    ACCESS            not-accessible
    STATUS            mandatory
    INDEX             { progFaultIndex }
    C_NEXT_FUNC        "SNMP_GETNEXT_stProgFaultTable"
    ::= { progFaultTable 1 }

ProgFaultEntry ::= SEQUENCE
{
    progFaultID                    INTEGER,
    progFaultParentID    INTEGER,
    progFaultInstanceID   INTEGER,
    progFaultType                  DisplayString,
    progFaultValue                INTEGER,
    progFaultIndex                INTEGER
}

progFaultID    OBJECT-TYPE
    SYNTAX        INTEGER ( 1..4294967296 )
    ACCESS        read-only
    C_TYPE        MsAgTeFaultStruct,            FIELD nID
    C_LOCATOR_FUNC        "SNMP_LOCATE_stProgFaultTable"
    STATUS        mandatory
    DESCRIPTION
        "This attribute represents the program ID of the
         running program which registered this performance
         metric with the MSS-SubAgent. A valid value is any
         positive integer which has an entry in the static
         application table. The mode and the ID uniquely identify
         this running program. For example, if 'FooProg' is

```

assigned ID 9876 then this attribute stores 9876."  
::= { progFaultEntry 1 }

progFaultParentID OBJECT-TYPE  
SYNTAX INTEGER ( 1..4294967296 )  
ACCESS read-only  
C\_TYPE MsAgTeFaultStruct, FIELD nParentID  
C\_LOCATOR\_FUNC "SNMP\_LOCATE\_stProgFaultTable"  
STATUS mandatory  
DESCRIPTION  
"This attribute represents the application ID of the  
running program which registered this performance  
metric with the MSS-SubAgent. This is the application  
ID that this program belongs to. A valid value is any  
positive integer which has an entry in the static  
program table. The mode and the ID uniquely identify  
this running program. For example, if application 'Foo'  
with ID 987 has program 'FooProg' with ID 9876 then this  
attribute stores 987, the parent ID."  
::= { progFaultEntry 2 }

progFaultInstanceID OBJECT-TYPE  
SYNTAX INTEGER ( 1..4294967296 )  
ACCESS read-only  
C\_TYPE MsAgTeFaultStruct, FIELD nInstanceID  
C\_LOCATOR\_FUNC "SNMP\_LOCATE\_stProgFaultTable"  
STATUS mandatory  
DESCRIPTION  
"This attribute holds the instance ID of this program.  
The MSS-SubAgent assigns an instance ID to each running  
application and program. This ID is used to distinguish  
between applications and programs which are running  
multiple times. If program 'FooProg\_OPS' is the first one  
to be started then its Instance ID is zero. If one starts  
it again then the second instance would hold an integer  
bigger than zero (depending on how many applications are  
started between FooProg\_OPS1 and FooProg\_OPS2)."  
::= { progFaultEntry 3 }

progFaultType OBJECT-TYPE  
SYNTAX DisplayString ( SIZE ( 0..25) )  
ACCESS read-only  
C\_TYPE MsAgTeFaultStruct, FIELD dsType  
C\_LOCATOR\_FUNC "SNMP\_LOCATE\_stProgFaultTable"  
STATUS mandatory  
DESCRIPTION  
"The attribute stores the type of fault metric which  
is being tracked at the program level. A valid value

is any nonempty string of up to 25 characters. An example is metric type '# Sybase access failures'."

::= { progFaultEntry 4 }

```

progFaultValue      OBJECT-TYPE
    SYNTAX          INTEGER ( 1..4294967296 )
    ACCESS           read-only
                    C_TYPE MsAgTeFaultStruct,      FIELD nValue
                    C_LOCATOR_FUNC      "SNMP_LOCATE_stProgFaultTable"
    STATUS           mandatory
    DESCRIPTION
        "This attribute tracks the current value of this fault
        metric. A valid value is a non-negative integer. In the
        '# Sybase access failures' example, the value attribute tracks
        the number of failures to access Sybase which might be 5."
::= { progFaultEntry 5 }

```

```

progFaultIndex      OBJECT-TYPE
    SYNTAX          INTEGER ( 1..4294967296 )
    ACCESS           read-only
                    C_TYPE MsAgTeFaultStruct,      FIELD nIndex
                    C_LOCATOR_FUNC      "SNMP_LOCATE_stProgFaultTable"
    STATUS           mandatory
    DESCRIPTION
        "The attribute holds the SNMP index ID which can
        be seen in the MIB browser. A valid value is any
        positive integer. If program 'FooProg' is the first
        program to be started by the MSS-SubAgent then
        'FooProg's SNMP index for this instance would be the
        integer 0."
::= { progFaultEntry 6 }

```

```

-----
--          Program Configuration Metric table
-----

```

```

progCfgTable OBJECT-TYPE
    SYNTAX          SEQUENCE OF ProgCfgEntry
    ACCESS           not-accessible
    STATUS           mandatory
    DESCRIPTION
        "This table contains program specific configuration
        metrics which consist of the various types and values
        of the program specific configurations. The type is any
        string that specifies the type of metric and the value
        is the corresponding value string."
::= { program 4 }

```

```

progCfgEntry OBJECT-TYPE
    SYNTAX      ProgCfgEntry
    ACCESS      not-accessible
    STATUS      mandatory
    INDEX       { progCfgIndex }
                C_NEXT_FUNC      "SNMP_GETNEXT_stProgCfgTable"
    ::= { progCfgTable 1 }

ProgCfgEntry ::= SEQUENCE
{
    progCfgID          INTEGER,
    progCfgParentID    INTEGER,
    progCfgInstanceID  INTEGER,
    progCfgType        DisplayString,
    progCfgValue        DisplayString,
    progCfgIndex        INTEGER
}

progCfgID OBJECT-TYPE
    SYNTAX      INTEGER (1..4294967296)
    ACCESS      read-only
                C_TYPE MsAgTeConfigStruct,      FIELD nID
                C_LOCATOR_FUNC      "SNMP_LOCATE_stProgCfgTable"
    STATUS      mandatory
    DESCRIPTION
        "This attribute represents the program ID of the
        running program which registered this performance
        metric with the MSS-SubAgent. A valid value is any
        positive integer which has an entry in the static
        program table. The mode and the ID uniquely identify
        this running program. For example, if 'FooProg' is
        assigned ID 9876 then this attribute stores 9876."
    ::= { progCfgEntry 1 }

progCfgParentID OBJECT-TYPE
    SYNTAX      INTEGER (1..4294967296)
    ACCESS      read-only
                C_TYPE MsAgTeConfigStruct,      FIELD nParentID
                C_LOCATOR_FUNC      "SNMP_LOCATE_stProgCfgTable"
    STATUS      mandatory
    DESCRIPTION
        "This attribute represents the application ID of the
        running program which registered this configuration
        metric with the MSS-SubAgent. This is the application
        ID that this program belongs to. A valid value is any
        positive integer which has an entry in the static
        program table. The mode and the ID uniquely identify

```

this running program. For example, if application 'Foo' with ID 987 has program 'FooProg' with ID 9876 then this attribute stores 987, the parent ID."

::= { progCfgEntry 2 }

```

progCfgInstanceID  OBJECT-TYPE
    SYNTAX      INTEGER (1..4294967296)
    ACCESS      read-only
                C_TYPE MsAgTeConfigStruct,      FIELD nInstanceID
                C_LOCATOR_FUNC      "SNMP_LOCATE_stProgCfgTable"
    STATUS      mandatory
    DESCRIPTION
        "This attribute holds the instance ID of this program.
        The MSS-SubAgent assigns an instance ID to each running
        application and program. This ID is used to distinguish
        between applications and programs which are running
        multiple times. If program 'FooProg_OPS' is the first one
        to be started then its Instance ID is zero. If one starts
        it again then the second instance would hold an integer
        bigger than zero (depending on how many applications are
        started between FooProg_OPS1 and FooProg_OPS2)."
```

::= { progCfgEntry 3 }

```

progCfgType  OBJECT-TYPE
    SYNTAX      DisplayString (SIZE(0..25))
    ACCESS      read-only
                C_TYPE MsAgTeConfigStruct,      FIELD dsType
                C_LOCATOR_FUNC      "SNMP_LOCATE_stProgCfgTable"
    STATUS      mandatory
    DESCRIPTION
        "This attribute stores the type of configuration metric which
        is being tracked at the program level. A valid value
        is any nonempty string of up to 25 characters. An example
        is metric type 'window color', a value that might tell
        the HP-OpenView operator the color of the program window."
```

::= { progCfgEntry 4 }

```

progCfgValue  OBJECT-TYPE
    SYNTAX      DisplayString (SIZE(0..25))
    ACCESS      read-only
                C_TYPE MsAgTeConfigStruct,      FIELD dsValue
                C_LOCATOR_FUNC      "SNMP_LOCATE_stProgCfgTable"
    STATUS      mandatory
    DESCRIPTION
        "This attribute tracks the current value of this configuration
        metric. A valid value is any string of at most 25 characters.
        In the 'window color' example, the value attribute tracks
        the color of the program window which might be the string
```

```

        'blue'."
    ::= { progCfgEntry 5 }

progCfgIndex OBJECT-TYPE
    SYNTAX      INTEGER (1..4294967296)
    ACCESS      read-only
    C_TYPE      MsAgTeConfigStruct,      FIELD nIndex
    C_LOCATOR_FUNC      "SNMP_LOCATE_stProgCfgTable"
    STATUS      mandatory
    DESCRIPTION
        "The attribute holds the SNMP index ID which can
        be seen in the MIB browser. A valid value is any
        positive integer. If program 'FooProg' is the first
        program to be started by the MSS-SubAgent then
        'FooProg's SNMP index for this instance would be the
        integer 0."
    ::= { progCfgEntry 6 }

END

PROCESS_TABLE DEFINITIONS ::= BEGIN

    IMPORTS
        OBJECT-TYPE                                FROM RFC-1212
        DisplayString, Enterprise                    FROM RFC1213-MIB
        TimeTicks                                    FROM RFC1155-SMI;

    process OBJECT IDENTIFIER ::= { enterprises ecs(2000) mss(1) agent(3) 4 }

-----
--          Process dynamic table
-----

procDyTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF ProgDyEntry
    ACCESS      not-accessible
    STATUS      mandatory
    DESCRIPTION
        "This table contains dynamic information about running
        process. Each time a program is started the MSS-SubAgent will
        insert an entry into this table of process information. For
        example, if program 'FooProg' is installed under mode
        'OPS' and mode 'TEST', and the HP-OpenView operator
        starts each of them once then the dynamic process table will
        hold two entries."
    ::= { process 1 }

procDyEntry OBJECT-TYPE

```

```

SYNTAX      ProcDyEntry
ACCESS      not-accessible
STATUS      mandatory
INDEX       { procIndex }
            C_NEXT_FUNC "SNMP_GETNEXT_procDyTable"
::= { procDyTable 1 }

```

ProcDyEntry ::= SEQUENCE

```

{
    procID          INTEGER,
    procMode        DisplayString,
    procProgID      INTEGER,
    procInstanceID  INTEGER,
    procUpTime      TimeTicks,
    procTTY          DisplayString,
    procUID          INTEGER,
    procGID          INTEGER,
    procPPID        INTEGER,
    procMgmtSvrObjID DisplayString,
    procPriority     INTEGER,
    procTimeToStop  INTEGER,
    procIndex       INTEGER
}

```

procID OBJECT-TYPE

```

SYNTAX      INTEGER ( 1..4294967296 )
ACCESS      read-only
            C_TYPE MsAgTeDyProcStruct, FIELD nID
            C_LOCATOR_FUNC "SNMP_LOCATE_procDyTable"
STATUS      mandatory
DESCRIPTION
    "This attribute represents the process ID of the
    running program. A valid value is any positive integer.
    For example, if program 'FooProg' is started and creates
    process 123 then this ID would contain 123."
::= { procDyEntry 1 }

```

procMode OBJECT-TYPE

```

SYNTAX      DisplayString (0..8)
ACCESS      read-only
            C_TYPE MsAgTeDyProcStruct, FIELD dsMode
            C_LOCATOR_FUNC "SNMP_LOCATE_procDyTable"
STATUS      mandatory
DESCRIPTION
    "This attribute represents the mode of the running
    process. A valid value is any nonempty strings
    which consists of at most 8 alphanumeric characters.
    The mode and the ID uniquely identify this running

```



process. Examples are TEST or OPS. For example,  
if the HP-OpenView operator starts program 'FooProg'  
under mode 'TEST' then this attribute holds TEST."

::= { procDyEntry 2 }

procProgID                    OBJECT-TYPE  
    SYNTAX                    INTEGER ( 1..4294967296 )  
  
    ACCESS                    read-only  
                              C\_TYPE MsAgTeDyProcStruct,     FIELD nParentID  
                              C\_LOCATOR\_FUNC                "SNMP\_LOCATE\_procDyTable"  
    STATUS                    mandatory  
    DESCRIPTION  
        "This attribute contains the parent ID of this process  
        which holds the ID of the program this process  
        belongs to. A valid value is any positive integer. If  
        program 'FooProg' with ID 9876 started this process  
        then this attribute would contain 9876."  
    ::= { procDyEntry 3 }

procInstanceID                OBJECT-TYPE  
    SYNTAX                    INTEGER ( 1..4294967296 )  
    ACCESS                    read-only  
                              C\_TYPE MsAgTeDyProcStruct,     FIELD nInstanceID  
                              C\_LOCATOR\_FUNC                "SNMP\_LOCATE\_procDyTable"  
    STATUS                    mandatory  
    DESCRIPTION  
        "This attribute holds the instance ID of this process.  
        If program 'FooProg\_OPS' is the first one to be started  
        then its Instance ID is zero. If one starts it again then  
        the second instance would hold an integer bigger than zero  
        (depending on how many applications are started between  
        FooProg\_OPS1 and FooProg\_OPS2)."  
    ::= { procDyEntry 4 }

procUpTime                    OBJECT-TYPE  
    SYNTAX                    TimeTicks  
    ACCESS                    read-only  
                              C\_TYPE MsAgTeDyProcStruct,     FIELD ttUpTime  
                              C\_LOCATOR\_FUNC                "SNMP\_LOCATE\_procDyTable"  
    STATUS                    mandatory  
    DESCRIPTION  
        "UpTime stores the number of milliseconds this process  
        has been running. That is, the time between now and when  
        the MSS-SubAgent received the 'startup' command. A valid  
        value is any positive integer which increases by 1 every  
        millisecond."  
    ::= { procDyEntry 5 }

```

procTTY          OBJECT-TYPE
    SYNTAX      DisplayString (SIZE(0..16))
    ACCESS      read-only
                C_TYPE MsAgTeDyProcStruct,    FIELD dsTTY
                C_LOCATOR_FUNC      "SNMP_LOCATE_procDyTable"
    STATUS      mandatory
    DESCRIPTION
        "This attribute contains the terminate type of the running
        process. Valid values are any strings no bigger than 16
        characters. An example is '/dev/ttyq8'."
    ::= { procDyEntry 6 }

```

```

procUID          OBJECT-TYPE
    SYNTAX      INTEGER ( 1..4294967296 )
    ACCESS      read-only
                C_TYPE MsAgTeDyProcStruct,    FIELD nUID
                C_LOCATOR_FUNC      "SNMP_LOCATE_procDyTable"
    STATUS      mandatory
    DESCRIPTION
        "This attribute holds the user ID of the process. It's
        a positive integer that identifies the user who started
        the process. If 'Bill Gates', with user ID 567, started
        program 'FooProg' then this attribute would store 567."
    ::= { procDyEntry 7 }

```

```

procGID          OBJECT-TYPE
    SYNTAX      INTEGER ( 1..4294967296 )
    ACCESS      read-only
                C_TYPE MsAgTeDyProcStruct,    FIELD nGID
                C_LOCATOR_FUNC      "SNMP_LOCATE_procDyTable"
    STATUS      mandatory
    DESCRIPTION
        "The attribute represents the group ID of the user who started
        this process. If 'Bill Gates', with group ID 4567, started
        program 'FooProg' then this attribute would store 4567."
    ::= { procDyEntry 8 }

```

```

procPPID         OBJECT-TYPE
    SYNTAX      INTEGER ( 1..4294967296 )
    ACCESS      read-only
                C_TYPE MsAgTeDyProcStruct,    FIELD nPPID
                C_LOCATOR_FUNC      "SNMP_LOCATE_procDyTable"
    STATUS      mandatory
    DESCRIPTION
        "This attribute stores the parent process ID. For example,
        if 'Bill Gates' login session had process ID 456, and Bill
        would start program 'FooProg' then this attribute would

```

```

        store 456."
 ::= { procDyEntry 9 }

procMgmtSvrObjID          OBJECT-TYPE
    SYNTAX DisplayString (SIZE(0..32))
    ACCESS      read-only
                C_TYPE MsAgTeDyProcStruct,    FIELD dsServerObjID
                C_LOCATOR_FUNC      "SNMP_LOCATE_procDyTable"
    STATUS      mandatory
    DESCRIPTION
        "This attribute contains the management server's object ID
        of the process which is a UUID that's assigned by the
        MSS-SubAgent. It's a universal unique string of fixed length
        which may look like: 0046cf4e-0160-1180-9e2d-9b9d6322aa77."
 ::= { procDyEntry 10 }

procPriority              OBJECT-TYPE
    SYNTAX      INTEGER ( 1..4294967296 )
    ACCESS      read-only
                C_TYPE MsAgTeDyProcStruct,    FIELD nPriority
                C_LOCATOR_FUNC      "SNMP_LOCATE_procDyTable"
    STATUS      mandatory
    DESCRIPTION
        "This attribute stores the priority at which this process is
        executing. When Bill Gates starts program 'FooProg' and the
        process had priority 23 then this attribute would hold 23."
 ::= { procDyEntry 11 }

procTimeToStop           OBJECT-TYPE
    SYNTAX INTEGER ( 1..4294967296 )
    ACCESS      read-only
                C_TYPE MsAgTeDyProcStruct,    FIELD nTimeToStop
                C_LOCATOR_FUNC      "SNMP_LOCATE_procDyTable"
    STATUS      mandatory
    DESCRIPTION
        "This attribute tells the HP-OpenView operator when the
        process will be terminate by the MSS-SubAgent. A valid
        value is any positive integer."
 ::= { procDyEntry 12 }

procIndex                OBJECT-TYPE
    SYNTAX      INTEGER ( 1..4294967296 )
    ACCESS      read-only
                C_TYPE MsAgTeDyProcStruct,    FIELD nIndex
                C_LOCATOR_FUNC      "SNMP_LOCATE_procDyTable"
    STATUS      mandatory
    DESCRIPTION
        "The attribute holds the SNMP index ID which can

```

be seen in the MIB browser. A valid value is any positive integer. If program 'FooProg' is the first program to be started by the MSS-SubAgent then 'FooProg's SNMP index for this instance would be the integer 0."

::= { procDyEntry 13 }

---

-- Process Performance Metric Table

---

```

procPerfTable      OBJECT-TYPE
    SYNTAX          SEQUENCE OF ProcPerfEntry
    ACCESS           not-accessible
    STATUS           mandatory
    DESCRIPTION
        "This table contains process specific performance
        metrics which consist of the various types and values
        of the process specific performances."
    ::= { process 2 }

procPerfEntry      OBJECT-TYPE
    SYNTAX          ProcPerfEntry
    ACCESS           not-accessible
    STATUS           mandatory
    INDEX           { procPerfIndex }
    C_NEXT_FUNC     "SNMP_GETNEXT_ProcPerfTable"
    ::= { procPerfTable 1 }

```

```

ProcPerfEntry ::= SEQUENCE
{
    procPerfID          INTEGER,
    procPerfParentID    INTEGER,
    procPerfInstanceID  INTEGER,
    procPerfType         DisplayString,
    procPerfValue        INTEGER,
    procPerfFaultThreshold  INTEGER,
    procPerfRearmFaultThd  INTEGER,
    procPerfMaxThreshold  INTEGER,
    procPerfRearmMaxThd    INTEGER,
    procPerfMinThreshold  INTEGER,
    procPerfRearmMinThd    INTEGER,
    procPerfIndex        INTEGER
}

```

```

procPerfID      OBJECT-TYPE
    SYNTAX       INTEGER ( 1..4294967296 )
    ACCESS       read-only

```

```

        C_TYPE MsAgTePerfStruct, FIELD nID
        C_LOCATOR_FUNC "SNMP_LOCATE_ProcPerfTable"
STATUS      mandatory
DESCRIPTION
    "This attribute represents the ID of the process which registered
    this performance metric with the MSS-SubAgent. A valid value is any
    positive integer."
::= { procPerfEntry 1 }

procPerfParentID    OBJECT-TYPE
SYNTAX      INTEGER ( 1..4294967296 )
ACCESS      read-only
        C_TYPE MsAgTePerfStruct, FIELD nParentID
        C_LOCATOR_FUNC "SNMP_LOCATE_ProcPerfTable"
STATUS      mandatory
DESCRIPTION
    "This attribute contains the parent ID of this process
    which holds the ID of the program this process
    belongs to. A valid value is any positive integer. If
    program 'FooProg' with ID 9876 started this process
    then this attribute would contain 9876."
::= { procPerfEntry 2 }

procPerfInstanceID  OBJECT-TYPE
SYNTAX      INTEGER ( 1..4294967296 )
ACCESS      read-only
        C_TYPE MsAgTePerfStruct, FIELD nInstanceID
        C_LOCATOR_FUNC "SNMP_LOCATE_ProcPerfTable"
STATUS      mandatory
DESCRIPTION
    "This attribute holds the instance ID of this process.
    If program 'FooProg_OPS' is the first one to be started
    then its Instance ID is zero. If one starts it again then
    the second instance would hold an integer bigger than zero
    (depending on how many applications are started between
    FooProg_OPS1 and FooProg_OPS2)."
::= { procPerfEntry 3 }

procPerfType OBJECT-TYPE
SYNTAX      DisplayString ( SIZE (0..25))
ACCESS      read-only
        C_TYPE MsAgTePerfStruct, FIELD dsType
        C_LOCATOR_FUNC "SNMP_LOCATE_ProcPerfTable"
STATUS      mandatory
DESCRIPTION
    "The attribute stores the type of performance metric which
    is being tracked at the process level. A valid value
    is any nonempty string of up to 25 characters. An example

```

is metric type 'number of windows open'.  
 ::= { procPerfEntry 4 }

procPerfValue OBJECT-TYPE  
 SYNTAX INTEGER ( 1..4294967296 )  
 ACCESS read-only  
 C\_TYPE MsAgTePerfStruct, FIELD nValue  
 C\_LOCATOR\_FUNC "SNMP\_LOCATE\_ProcPerfTable"  
 STATUS mandatory  
 DESCRIPTION  
 "This attribute tracks the current value of this performance  
 metric. A valid value is a non-negative integer. In the  
 'number of windows open' example, the value attribute tracks  
 the number of windows open which might be 2."  
 ::= { procPerfEntry 5 }

procPerfFaultThreshold OBJECT-TYPE  
 SYNTAX INTEGER ( 1..4294967296 )  
 ACCESS read-only  
 C\_TYPE MsAgTePerfStruct, FIELD nFaultThreshold  
 C\_LOCATOR\_FUNC "SNMP\_LOCATE\_ProcPerfTable"  
 STATUS mandatory  
 DESCRIPTION  
 "This attribute determines when the threshold value becomes a  
 fault. When the current value exceeds the fault threshold  
 value then the MSS-SubAgent will generate an event. The  
 following line illustrates the relation among the various  
 threshold values:  
 $\text{min} < \text{minRearm} < \text{maxRearm} < \text{max} < \text{faultRearm} < \text{fault}.$   
 For example, if the fault threshold is 10 and the current  
 value is 12 then the MSS-SubAgent will take some action."  
 ::= { procPerfEntry 6 }

procPerfRearmFaultThd OBJECT-TYPE  
 SYNTAX INTEGER ( 1..4294967296 )  
 ACCESS read-only  
 C\_TYPE MsAgTePerfStruct, FIELD nRearmFaultThreshold  
 C\_LOCATOR\_FUNC "SNMP\_LOCATE\_ProcPerfTable"  
 STATUS mandatory  
 DESCRIPTION  
 "This attribute stores the rearm fault value. A valid value  
 for this threshold is any integer smaller than the fault  
 threshold value for this performance metric. The following  
 line illustrates the relation among the various threshold  
 values:  
 $\text{min} < \text{minRearm} < \text{maxRearm} < \text{max} < \text{faultRearm} < \text{fault}.$   
 The following example illustrates the need for the rearm value:  
 If the fault threshold is 10 and the current value changes

back and forth from 9 to 11 then the MSS-SubAgent shouldn't take an action each time the fault threshold is exceeded. If the rearm fault value is 8 then in the above scenario the MSS-SubAgent would create one event because the current value exceeded the fault threshold for the first time. But as long as the current value remains above 8 then no action is taken by the MSS-SubAgent. But as soon as the current value changes to 7 and then exceeds 10 another event is created by the MSS-SubAgent."

::= { procPerfEntry 7 }

```
procPerfMaxThreshold      OBJECT-TYPE
    SYNTAX      INTEGER ( 1..4294967296 )
    ACCESS      read-only
    C_TYPE      MsAgTePerfStruct, FIELD nMaxThreshold
    C_LOCATOR_FUNC "SNMP_LOCATE_ProcPerfTable"
    STATUS      mandatory
    DESCRIPTION
        "This attribute determines when the threshold value exceeds
        the maximum value. When the current value exceeds the
        maximum threshold value then the MSS-SubAgent will generate
        an event. For example, if the maximum threshold is 10 and the
        current value is 12 then the MSS-SubAgent will take some action.
        The following line illustrates the relation among the various
        threshold values:
        min < minRearm < maxRearm < max < faultRearm < fault."
::= { procPerfEntry 8 }
```

```
procPerfRearmMaxThd      OBJECT-TYPE
    SYNTAX      INTEGER ( 1..4294967296 )
    ACCESS      read-only
    C_TYPE      MsAgTePerfStruct, FIELD nRearmMaxThreshold
    C_LOCATOR_FUNC "SNMP_LOCATE_ProcPerfTable"
    STATUS      mandatory
    DESCRIPTION
        "This attribute stores the rearm max value. A valid value
        for this threshold is any integer smaller than the max
        threshold value for this performance metric. The following
        line illustrates the relation among the various threshold
        values:
        min < minRearm < maxRearm < max < faultRearm < fault.
        The following example illustrates the need for the rearm value:
        If the max threshold is 10 and the current value changes
        back and forth from 9 to 11 then the MSS-SubAgent shouldn't
        take an action each time the max threshold is exceeded.
        If the rearm max value is 8 then in the above scenario
        the MSS-SubAgent would create one event because the current
        value exceeded the max threshold for the first time. But
```

as long as the current value remains above 8 then no action is taken by the MSS-SubAgent (unless the fault threshold value is exceeded). But as soon as the current value changes to 7 and then exceeds 10 another event is created by the MSS-SubAgent."

::= { procPerfEntry 9 }

procPerfMinThreshold OBJECT-TYPE

SYNTAX INTEGER ( 1..4294967296 )

ACCESS read-only

C\_TYPE MsAgTePerfStruct, FIELD nMinThreshold

C\_LOCATOR\_FUNC "SNMP\_LOCATE\_ProcPerfTable"

STATUS mandatory

DESCRIPTION

"This attribute determines when the threshold value is lower than the minimum value. When the current value is lower than the minimum threshold value then the MSS-SubAgent will generate an event. For example, if the minimum threshold is 10 and the current value is 8 then the MSS-SubAgent will take some action. The following line illustrates the relation among the various threshold values:

min < minRearm < maxRearm < max < faultRearm < fault."

::= { procPerfEntry 10 }

procPerfRearmMinThd OBJECT-TYPE

SYNTAX INTEGER ( 1..4294967296 )

ACCESS read-only

C\_TYPE MsAgTePerfStruct, FIELD nRearmMinThreshold

C\_LOCATOR\_FUNC "SNMP\_LOCATE\_ProcPerfTable"

STATUS mandatory

DESCRIPTION

"This attribute stores the rearm min value. A valid value for this threshold is any integer bigger than the min threshold value for this performance metric. The following line illustrates the relation among the various threshold values:

min < minRearm < maxRearm < max < faultRearm < fault.

The following example illustrates the need for the rearm value:

If the min threshold is 10 and the current value changes back and forth from 9 to 11 then the MSS-SubAgent shouldn't take an action each time the value is less than the min threshold value. If the rearm min value is 12 then in the above scenario the MSS-SubAgent would create one event because the current value is lower than the min threshold for the first time. But as long as the current value remains below 12 then no action is taken by the MSS-SubAgent. But as soon as the current value changes to 13 and then to 7 another event is created by the MSS-SubAgent."



```

::= { procPerfEntry 11 }

procPerfIndex OBJECT-TYPE
    SYNTAX      INTEGER ( 1..4294967296 )
    ACCESS      read-only
    C_TYPE      MsAgTePerfStruct, FIELD nIndex
    C_LOCATOR_FUNC "SNMP_LOCATE_ProcPerfTable"
    STATUS      mandatory
    DESCRIPTION
        "The attribute holds the SNMP index ID which can
        be seen in the MIB browser. A valid value is any
        positive integer. If program 'FooProg' is the first
        program to be started by the MSS-SubAgent then
        'FooProg's SNMP index for this instance would be the
        integer 0."
::= { procPerfEntry 12 }

-----
--          Process Fault Metric Table
-----

procFaultTable      OBJECT-TYPE
    SYNTAX      SEQUENCE OF ProcFaultEntry
    ACCESS      not-accessible
    STATUS      mandatory
    DESCRIPTION
        "This table contains application specific fault
        metrics which consist of the various types and values
        of the process specific fault. The type is any string
        and the value is a counter of the specified fault type."
::= { process 3 }

procFaultEntry      OBJECT-TYPE
    SYNTAX      ProcFaultEntry
    ACCESS      not-accessible
    STATUS      mandatory
    INDEX      { procFaultIndex }
    C_NEXT_FUNC      "SNMP_GETNEXT_ProcFaultTable"
::= { procFaultTable 1 }

ProcFaultEntry ::= SEQUENCE
{
    procFaultID          INTEGER,
    procFaultParentID    INTEGER,
    procFaultInstanceID  INTEGER,
    procFaultIndex       INTEGER,
    procFaultType         DisplayString,
    procFaultValue        INTEGER
}

```

```

}

procFaultID OBJECT-TYPE
    SYNTAX      INTEGER ( 1..4294967296 )
    ACCESS      read-only
                C_TYPE MsAgTeFaultStruct,      FIELD nID
                C_LOCATOR_FUNC      "SNMP_LOCATE_ProcFaultTable"
    STATUS      mandatory
    DESCRIPTION
        "This attribute represents the ID of the process which registered
        this fault metric with the MSS-SubAgent. A valid value is any
        positive integer."
    ::= { procFaultEntry 1 }

procFaultParentID OBJECT-TYPE
    SYNTAX      INTEGER ( 1..4294967296 )
    ACCESS      read-only
                C_TYPE MsAgTeFaultStruct,      FIELD nParentID
                C_LOCATOR_FUNC      "SNMP_LOCATE_ProcFaultTable"
    STATUS      mandatory
    DESCRIPTION
        "This attribute contains the parent ID of this process
        which holds the ID of the program this process
        belongs to. A valid value is any positive integer. If
        program 'FooProg' with ID 9876 started this process
        then this attribute would contain 9876."
    ::= { procFaultEntry 2 }

procFaultInstanceID OBJECT-TYPE
    SYNTAX      INTEGER ( 1..4294967296 )
    ACCESS      read-only
                C_TYPE MsAgTeFaultStruct,      FIELD nID
                C_LOCATOR_FUNC      "SNMP_LOCATE_ProcFaultTable"
    STATUS      mandatory
    DESCRIPTION
        "This attribute holds the instance ID of this process.
        If program 'FooProg_OPS' is the first one to be started
        then its Instance ID is zero. If one starts it again then
        the second instance would hold an integer bigger than zero
        (depending on how many applications are started between
        FooProg_OPS1 and FooProg_OPS2)."
    ::= { procFaultEntry 3 }

procFaultIndex OBJECT-TYPE

    SYNTAX      INTEGER ( 1..4294967296 )
    ACCESS      read-only
                C_TYPE MsAgTeFaultStruct,      FIELD nIndex

```

```

        C_LOCATOR_FUNC      "SNMP_LOCATE_ProcFaultTable"
STATUS      mandatory
DESCRIPTION
    "The attribute holds the SNMP index ID which can
    be seen in the MIB browser. A valid value is any
    positive integer. If program 'FooProg' is the first
    program to be started by the MSS-SubAgent then
    'FooProg's SNMP index for this instance would be the
    integer 0."
::= { procFaultEntry 4 }

```

```

procFaultType      OBJECT-TYPE
SYNTAX      DisplayString ( SIZE ( 0..25))
ACCESS      read-only
        C_TYPE MsAgTeFaultStruct,      FIELD dsType
        C_LOCATOR_FUNC      "SNMP_LOCATE_ProcFaultTable"
STATUS      mandatory
DESCRIPTION
    "The attribute stores the type of fault metric which
    is being tracked at the process level. A valid value
    is any nonempty string of up to 25 characters. An example
    is metric type '# Sybase access failures'."
::= { procFaultEntry 5 }

```

```

procFaultValue      OBJECT-TYPE
SYNTAX      INTEGER ( 1..4294967296 )
ACCESS      read-only
        C_TYPE MsAgTeFaultStruct,      FIELD nValue
        C_LOCATOR_FUNC      "SNMP_LOCATE_ProcFaultTable"
STATUS      mandatory
DESCRIPTION
    "The attribute holds the SNMP index ID which can
    be seen in the MIB browser. A valid value is any
    positive integer. If program 'FooProg' is the first
    program to be started by the MSS-SubAgent then
    'FooProg's SNMP index for this instance would be the
    integer 0."
::= { procFaultEntry 6 }

```

END

# Abbreviations and Acronyms

---

3GL	Third Generation Language
4GL	Fourth Generation Language
ACL	access control list
ADC	affiliated data center
AI&T	algorithm integration and test
AK	alternate key
AM-1	EOS AM Project spacecraft 1, morning spacecraft series -- ASTER, CERES, MISR, MODIS and MOPITT instruments
ANSI/X3/SPARC	American National Standards Institute, American National Standards Committee on Computers and Information Processing, Standards Planning and Requirements Committee
API	applications program interface
ASF	Alaska Synthetic Aperture Radar (SAR) Facility
ASN. 1	abstract syntax notation one
AST	algorithm support team
ASTER	Advanced Spaceborne Thermal Emission and Reflection Radiometer (formerly ITIR)
BBS	bulletin board server
BBS	bulletin board system
C3	communications, command and control
CCB	Change Control Board (Hughes Convention)
CCB	Configuration Control Board (NASA Convention)
CCITT	Consultative Committee for International Telecommunication and Telegraph
CCR	change control request
CD	compact disk
CD-ROM	compact disk - read only memory
CDR	Critical Design Review
CDRL	Contract Data Requirements List

CDS	cell directory service
CERES	Clouds and Earth's Radiant Energy System
CERN	European Laboratory for Particle Physics
CESDIS	Center for Excellence in Space Data and Information Sciences
CESDS	Central Environmental Satellite Data System (NOAA)
CHUI	character user interface
CI	configuration item
CMIP	common management information protocol
CMIS	common management information services
CORBA	common object request broker architecture
COTS	commercial off-the-shelf (hardware or software)
CPU	central processing unit
CS	client server (use client-server for EDHS search)
CSA	Canadian Space Agency
CSMS	Communications and Systems Management Segment (ECS)
CSU	computer software unit
DAA	DAN acknowledge
DAA	data availability acknowledgment
DAAC	distributed active archive center
DAN	data availability notice
DB	database
DBA	database administration
DBMS	database management system
DCE	distributed computing environment (OSF)
DCHCI	distributed computing hardware configuration item
DCL	data control language
DCN	document change notice
DDA	data delivery acknowledgment
DDL	data definition language
DDN	data delivery notice
DFD	data flow diagram

DID	data item description
DIF	data ingest facility
DIS	data ingest and server
DME	distributed management environment
DML	data manipulation language
DTS	distributed time service
E-mail	electronic mail (use email for EDHS search)
E-R	entity-relationship
Ecom	EOSDIS Communications System
ECS	EOSDIS Core System
EDC	Earth Resources Observation Systems (EROS) Data Center
EDF	ECS development facility
EDHS	ECS Data Handling System
EDOS	EOSDIS Data and Operations System
EMC	enterprise monitoring and coordination
EOC	EOS Operations Center (ECS)
EOSDIS	Earth Observing System Data and Information System
EP6	Evaluation Package 6 (use EP-6 for EDHS search)
ERD	Entity Relationship Diagram
EROS	Earth Resources Observation System
ESDIS	Earth Science Data and Information System (GSFC Code 505)
FDDI	fiber distributed data interface
FK	foreign key
FOS	flight operations system
ftp	file transfer protocol
GB	Gigabyte
GB	gigabyte ( $10^9$ )
GSFC	Goddard Space Flight Center
http	hypertext transport protocol
HW	hardware
HWCI	hardware configuration item

Ir- 1	interim release one (use Ir- 1 for EDHS search)
ISS	internetworking subsystem (CSMS)
JPL	Jet Propulsion Laboratory (DAAC)
Kerberos	security protocol developed by MIT; base for DCE security
Kftp	Kerberized file transfer protocol
LAN	local area network
Landsat	Land Remote-Sensing Satellite
LaRC	Langley Research Center (DAAC)
LRU	lowest replaceable unit
LIMS	Lewis (Research Center) Information Management System
LIMS	logistics inventory management system
LIS	Lightning Imaging Sensor
LISP	computer programming language
LLC	logical link control
LMS	logistics management support
LSM	local system management (ECS)
M&O	maintenance and operations
MACI	management agent configuration item
MAGIC	Multidimensional Applications and Gigabit Internetwork Consortium
MB	megabyte ( $10^6$ )
Mb	megabit ( $10^6$ )
MBONE	multicast backbone
MBps	megabytes per second
MCI	management software configuration item
MDT	mean downtime
MgtDBMS	CSMS management database
MIB	management information base
MSFC	Marshall Space Flight Center (DAAC)
MSS	management subsystem (CSMS)
MSSHW	MSS Hardware CI
MTBF	mean time between failure

MTBM	mean time between maintenance
MTBPM	mean time between preventive maintenance
MTPE	Mission to Planet Earth
MTTR	mean time to restore
MUX	multiplexer
NASA	National Aeronautics and Space Administration
Nascom	NASA Communications
NSIDC	National Snow and Ice Data Center (DAAC)
OA	office automation
OASIS	Operations and Science Instrument Support
ODBMS	object oriented data management system
ODC	other data center
OMG	object management group
OMT	Object Modeling Technique
OO	object oriented
OOA	object oriented analysis
OOD	object oriented design
OODBMS	object oriented database management system
OODCE	object oriented DCE
OORDB	object oriented relational data base
ORDBMS	object rational database management system
ORNL	Oak Ridge National Laboratory (DAAC)
PDB	project database
PI	principal investigator
PID	parameter ID
PMS	performance measurement system
POSIX	Portable Operating System Interface for Computer Environments
PSCN	Program Support Communications Network
PSDN	Packet Switched Data Network
RAID	redundant array of inexpensive disks
RDA	remote database access



RDBMS	relational database management system
RID	review item discrepancy
RMA	reliability, maintainability, availability
RMS	resource management subsystem
RRDB	recommended requirements database
RTM	requirements traceability matrix
RTM	requirements traceability model
RTS	real time subsystem
RTS	real-time server
RTS	relative time sequence
SAR	Synthetic Aperture Radar
SDPS	Science Data Processing Segment (ECS)
Seasat	Sea Satellite
SeaWiFS	Sea-Viewing Wide Field-of-View Sensor
SEDAC	Socio-Economic Data and Applications Center (CIESIN)
SLOC	source lines of code
SMC	System Monitoring and Coordination (ECS)
SN	space network
SNMP	simple network management protocol
SRS	software requirements specification
StP	Software Through Pictures
StP/OMT	Software Through Pictures/Object Modeling Technique
SWCI	software configuration item
TELNET	telecommunication network
TRMM	Tropical Rainfall Measuring Mission
TSDIS	TRMM Science Data and Information System
UDP	user datagram protocol
UTC	universal time code
VO	Version O
WAN	Wide Area Network
X.400	OSI standard for mail services

X.500

OSI standard for directory services (207)